IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

EMC CORPORATION,)
EMC INTERNATIONAL COMPANY,)
And EMC INFORMATION SYSTEMS)
INTERNATIONAL,) Trial Volume 2
)
Plaintiffs,)
) C.A. No.
v.) 13-1985-RGA
)
Pure STORAGE, INC.,)
)
Defendant.)

Tuesday, March 8, 2016
9:00 a.m.
Courtroom 6A

844 King Street
Wilmington, Delaware

BEFORE: THE HONORABLE RICHARD G. ANDREWS
United States District Court Judge

APPEARANCES:

MORRIS, NICHOLS, ARSHT & TUNNELL, LLP
BY: JACK B. BLUMENFELD, ESQ.

-and-

GIBSON, DUNN & CRUTCHER, LLP
BY: JOSH A. KREVITT, ESQ.
BY: PAUL E. TORCHIA, ESQ.
BY: STUART M. ROSENBERG, ESQ.
BY: KATHERINE DOMINGUEZ, ESQ.

-and-

APPEARANCES (Cont'd):

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-and-

KEKER & VAN NEST, LLP
BY: ROBERT A. VAN NEST, ESQ.
BY: MATTHEW WERDEGAR, ESQ.
BY: CORY JOHANNINGMEIER, ESQ.
BY: R. ADAM LAURIDSEN, ESQ.
BY: DAVID W. RIZK, ESQ.

Counsel for the Defendants

THE COURT: Good morning, everyone. Please be seated. So how is everybody?

MR. VAN NEST: Fine, Your Honor. Thank you.

THE COURT: Do you have anything for me?

MR. VAN NEST: We do. Good morning.

THE COURT: Good morning.

MR. VAN NEST: I think one of the witnesses this morning will be Professor Li.

THE COURT: Professor who?

MR. VAN NEST: Li. He's the inventor of the '464. And he was, as you recall, well, disclosed late. You offered some curative discovery and we've taken that. I think they expect to call him on a number of subjects related to commercial success of Data Domain. And while I don't object to him talking about his invention and whatever invention story he has, for a number of reasons it would be improper to allow him to do that now. Number one, he was never disclosed to somebody on

commercial success and the first time that anything came out of his mouth on it was during the curative phase, which we were given to cure the fact that he hadn't been disclosed earlier and they hadn't ever talked about an earlier invention date. Number two, with obviousness out, I question any testimony really about the commercial success of Data Domain. They are not seeking damages based on any Data Domain products. Data Domain is not in the same market with Pure or XtremeIO. Data Domain never made a Flash product. They are not even in the primary storage market.

So for a number of reasons, leading off really with discovery, I think that shouldn't be allowed. I believe the most offensive part of it will be testimony from him about revenues from Data Domain's products. They have product revenues, obviously. Again, those products don't compete with either XtremeIO or Pure. They are large numbers. They'd be prejudicial, and again, the relevance of that, if there is any, is minimal. And it wasn't disclosed until very late in the game.

He was not a Rule 26 disclosure on commercial success and he didn't -- he wasn't proffered during discovery on that. We didn't take any discovery.

During the curative phase, it's true, when we were done asking about conception, they lobbed in some redirect for the very first time without having given us any notice ahead of time and that's why I know this is coming or may be and I don't think it's proper.

THE COURT: All right.

MR. KREVITT: Your Honor, very briefly, we can address the relevance of the commercial success of Data Domain if you'd like, but there's a much shorter answer to this.

THE COURT: Okay.

MR. KREVITT: Pure Storage filed a motion in limine on Doctor Kai Li. The motion in limine was directed specifically to commercial success. Doctor Kai Li should not be permitted to testify with respect to commercial success. That was a motion in limine submitted to this court. We had argument on that. Part of that motion in limine that Pure Storage filed

was that EMC should not be able to call Frank Slootman.

The parties went away after Your Honor reserved ruling on some of the motions in limine. We had extensive, more than you might imagine, negotiations on these topics, multiple drafts going back and forth and the resolution was this and memorialized and submitted to Your Honor in a writing, in exchange for withdrawing our request to call Frank Slootman, so we forewent any --

THE COURT: I remember seeing a letter. I don't remember exactly what it said. Do you have a copy of it?

MR. KREVITT: We are putting our hands on it now. I didn't -- I didn't anticipate this issue being raised this morning, I apologize.

THE COURT: No need to apologize.

MR. KREVITT: I can represent to Your Honor, not in hoc verba, but having participated in the discussions, the deal was we were going to withdraw Frank Slootman so we were telling Your Honor rule in their favor on the

Frank Slootman motion in limine effectively. And in exchange, explicitly in exchange, Pure Storage withdrew all objections to EMC calling Doctor Kai Li, including with respect to commercial success.

THE COURT: Okay. So Mr. Van Nest, you recall this letter?

MR. VAN NEST: I've been reminded of it. But there's two things that are not correct. One is that's before we removed any obviousness case on the deduplication. Right? In other words, at that time, we still maintained an obviousness case and commercial success is relevant to that. We've withdrawn that as to the deduplication patents.

THE COURT: Okay. So that's really -- that's a different argument than saying, you know, it's a discovery violation. That's saying it's not relevant.

MR. VAN NEST: That's right. I said this morning that without obviousness, it's not -- but the other point is, I don't believe we withdraw all our objections. I think the objection we may have withdrawn as to late

discovery. If that's true, of course, that's my fault for raising it. But I do think that we reserved other objections to relevance and the like. And right now --

THE COURT: I would imagine you did -- that relevance wasn't decided by the letter.

MR. VAN NEST: Sure.

THE COURT: But since you let off with is a discovery violation, sounding to me like that's actually been resolved.

MR. VAN NEST: It may have been. But look where we are in the trial now. We don't have an obviousness case. It's clear that Data Domain is not even in the market.

THE COURT: All right. So let me go back. Mr. Krevitt was promising a short solution and he did cut off your first leg. How about the second leg?

MR. KREVITT: It was the only leg raised with us, so I now have another leg to deal with. The short answer to that is there is no dispute in this case that the Data Domain product embodies the patents in suit, two of the

patents in suit, the deduplication patents, the '015 and '464. That's where we start. We're talking about relevance. There's no dispute about that. The success of the product that incorporated the technology is explicitly and highly relevant to damages, including lost profits and reasonable royalty. In fact --

THE COURT: So the product -- so first off when you talk about the success of the Data Domain, what you're actually talking about is revenues for something that Data Domain sold; right?

MR. KREVITT: Yes, Your Honor. Revenues attributable to products embodying the patented invention.

THE COURT: And right. So I just want to make sure because, you know, we're talking kind of general terms, Data Domain success, what we're really talking about is numbers relating to some product or product that Data Domain sold; right?

MR. KREVITT: Your Honor has it exactly right. In fact, it's an important distinction because you may recall my colleague,

Mr. Torchia, tried to convince the Court that we should be able to put in the --

THE COURT: Right.

MR. KREVITT: And this was precisely the distinction that the Court drew which was that's to attenuated to talk about a big price, this is revenues directly attributable to the product.

THE COURT: This may not be -- what is the name of the product that Data Domain sold?

MR. KREVITT: I think it was called Data Domain.

MR. TORCHIA: I believe it's called Data Domain Deduplication DDR.

MR. KREVITT: Data Domain Deduplication.

THE COURT: And this was sold over what time period?

MR. TORCHIA: So Your Honor, this was sold from 2003 all the way up past the acquisition, and still on the market and Dr. Li has personal knowledge of the revenues of the patented product.

THE COURT: So you say, Mr. Krevitt, that it is undisputed that the body of the patent or two of the patents, is that, in fact, correct, Mr. Van Nest?

MR. VAN NEST: Excuse me, Your Honor, I was looking at the letter.

THE COURT: Okay. Mr. Krevitt says that the sales of these Data Domain products embodied the patent.

MR. VAN NEST: There is no opinion in the case to that fact. Mr. Jestice, their expert, does not go through a technical analysis of any kind to tie the products to the patents and that's the thing we have been saying, there is no nexus to these patents.

THE COURT: Right. And by nexus, you just mean does it practice the patent?

MR. VAN NEST: There is no opinion from any technical expert or witness in the case, Jestice didn't --

THE COURT: I got your point there.

Mr. Torchia.

MR. TORCHIA: Mr. Rosenberg is

about to show you that there is such an opinion.

MR. KREVITT: There is an opinion, Your Honor. Dr. Li, Mr. Rosenberg will come, Dr. Li is sitting in the room.

THE COURT: Over there?

MR. KREVITT: Over there.

THE COURT: You pointed to Mr. Shaw.

MR. KREVITT: And in a half hour is going to testify that it embodies and for purposes of relevance, to understand relevance, we should assume that the product embodies the patents. We're happy to show you that there is evidence of that.

THE COURT: I would like to see that evidence because apparently you have it easily at hand.

MR. KREVITT: Yes, and we also --

MR. TORCHIA: We're about to put it up on the screen.

THE COURT: Okay.

MR. VAN NEST: Again, as Your Honor knows, Dr. Li was certainly never disclosed as an expert on this topic and never

presented during discovery on it. The first time we talked to him was after summary judgment when they threw him in on conception, so if there is an opinion, it's news to me and it's very late.

MR. KREVITT: Your Honor, Dr. Li was identified in Pure Storage's initial disclosures. They could have deposed him at any time and chose not to.

MR. TORCHIA: This is --

THE COURT: So that looks like page 127 of somebody's expert report.

MR. KREVITT: This is our expert, Your Honor.

THE COURT: The name of your expert?

MR. KREVITT: Ian Jestice.

THE COURT: So, I mean, without knowing, recalling exactly -- so five of those six claims, and some number of the '464 patent claims.

MR. KREVITT: Yes, Your Honor.

THE COURT: Okay.

MR. KREVITT: If you go further,

claim 32.

THE COURT: What do you have to say about that, Mr. Van Nest?

MR. VAN NEST: May I have a moment, Your Honor?

He has an opinion in his report, Your Honor. It's not much. He doesn't cite the source code or do any analysis, he cites testimony, but he has an opinion.

THE COURT: So he has an opinion. I think from what I'm gathering, though, Mr. Van Nest, you were just looking at the letter, that you know, the objections about we didn't know about this or that, that seems to have been lost in this letter, so it's really a question of whether it's relevant or not.

And I guess the success of, commercial success of the product that embodied the patents is something that is listed in the Georgia-Pacific factors as a consideration, so unless I hear something else, I'm going to let him do it.

MR. KREVITT: As well as for lost profits.

MR. VAN NEST: I don't know why there should be any discussion of the numbers themselves, Your Honor, apart from the fact that the product was successful. Particularly given the state of the record now, where obviousness is out, and it may be a minor Georgia-Pacific factor, but you know, their expert doesn't rely on the numbers. Their expert in the expert report doesn't say I'm relying on, he's got a sentence on commercial success that doesn't go into any detail at all.

THE COURT: What does the sentence say?

MR. VAN NEST: He says I understand that the products have been commercially successful.

THE COURT: I think they can put in some evidence to support that opinion.

MR. KREVITT: Thank you, Your Honor.

MR. VAN NEST: Very well, Your Honor.

THE COURT: All right. Is there anything else?

MR. VAN NEST: I'm not aware of anything else, Your Honor.

THE COURT: Mr. Krevitt, do you have anything else?

MR. KREVITT: Not at the moment, Your Honor. Mr. Torchia said something to me.

THE COURT: Do you want to speak to him for a second?

MR. KREVITT: I don't think I need to raise it right now, Your Honor.

THE COURT: All right. And so just I'll leave in a minute so you can do your last second things, but the order of battle this morning, Mr. Krevitt, is what?

MR. KREVITT: Yes, Your Honor. So Mr. Cobb, our witness from yesterday is still on cross-examination. We understand there is another fifteen or twenty minutes, or maybe that grew overnight.

THE COURT: Or maybe it shrunk.

MR. KREVITT: Hopefully it shrunk. And then there may be some redirect, I don't anticipate that will be very long.

THE COURT: This is too much

detail. Who is coming after Cobb?

MR. KREVITT: Got it. Dr. Li.

THE COURT: Now, you expect the direct of him to be in the ballpark of?

MR. KREVITT: Forty minutes.

THE COURT: And so probably we'll have some other witness before lunch. Do you expect to do depositions or what?

MR. KREVITT: I don't think so, Your Honor. I think what we would do right then is get started with Mr. Jestice, our technical expert on the dedup patents.

THE COURT: If we do that, that will certainly take us to lunch.

MR. KREVITT: Yes.

THE COURT: Okay. I'll be back in.

MR. KREVITT: Your Honor, there is one issue that I'm sorry, I should have told you before you stood up that the parties are still conferring about, so we're happy to continue to confer, I just don't want too much time to go by without raising it with the Court. But if you prefer us to see if we can work it out.

It deals with an issue from our perspective, an issue that was raised in Mr. Van Nest's opening statement that opened the door to revisiting some rulings that Your Honor made earlier.

THE COURT: Well, as you may have noticed, I was listening to your opening statements. So I didn't hear anything, but I wasn't listening to it with the same attention to detail that I'm sure you were. If you want to give me a suggestion as to what it is, I'm happy -- I don't want to resolve it now, I think you should talk to each other, but it will help me to think about it.

MR. KREVITT: I'm happy to do that, Your Honor. I didn't want too much time to past, but at the same time we are candidly speaking about it.

As Your Honor may recall, another motion in liminae was Pure Storage had moved to prevent EMC from introducing evidence about Pure Storage's IPO, how much money it has, it's financial condition, it's got a lot of money. And Your Honor --

THE COURT: What did he say that opened this up?

MR. KREVITT: And what we said at the time when we opposed that was that we had concerns that Pure Storage was going to portray itself as the little guy in the marketplace. In fact, we specifically said David and Goliath.

THE COURT: I think you said that in your opening.

MR. KREVITT: No, I don't think so, Your Honor. I don't believe so, if I did, I certainly didn't mean to. And Mr. Van Nest said exactly the issue, exactly the issue that we were concerned about, Your Honor, portrayed and using the words, we, Pure Storage, are the little guy in the market. We believe it's relevant to a whole host of issues. As I say, we're talking about ways to handle it, either with stipulations or otherwise.

THE COURT: He'll let you all continue to talk about that. I do appreciate you bringing it up, because -- I do appreciate you bringing it up. We'll be in recess for a few more minutes.

(A brief recess was taken.)

THE COURT: All right. We're going to get the jury. Mr. Cobb, you can come forward and take the witness seat if you hurry up.

THE WITNESS: Thank you, Your Honor.

THE COURT: Good morning, members of the jury. Everyone, you may be seated. Members of the jury, thank you all for being here on time and we're on time too, so Mr. Werdegar, you may continue your cross-examination.

MR. WERDEGAR: Thank you, Your Honor.

BY MR. WERDERGAR:

Q. And good morning, Mr. Cobb. Welcome back.

A. Good morning. Thank you.

Q. You testified yesterday that EMC introduced a version of its VMAX product with some Flash and some hard disks back in 2008, right?

A. Yes, a hybrid array.

Q. The hybrid array, right. Now that hybrid array that EMC began offering in 2008 did not have deduplication, right?

A. That's correct.

Q. Okay. And EMC did not add deduplication to its VMAX product after it acquired Data Domain, did it?

A. That's correct.

Q. Okay. And did EMC last month introduced a new All-Flash version of its VMAX product, right?

A. Yes, sir, we did.

Q. Okay. And that new All-Flash version of VMAX does not have data deduplication, right?

A. No, it does not.

Q. Okay. Now, Mr. Cobb, you're familiar with the term use case in the storage context, aren't you?

A. Yes. It's used in several different ways, but I'm generally familiar with it.

Q. And one way it's used is to describe how a customer will be using the

storage product, correct?

A. That's correct.

Q. So they might have a data base use case, for example, in connection with a data base application; is that right?

A. Yes, that's correct.

Q. And it's correct, is it not, that there are uses for a storage product for which data deduplication provides little or no benefit, correct?

A. Yes, some use cases have more duplicate data than other use cases do.

Q. And some use cases are essentially not deduplicable; is that correct?

A. Correct. The benefits of deduplication for that would be marginal.

Q. Okay. For example, for many data base use cases, there is little or no space saving benefit from deduplication, correct?

A. When compared to the other use cases, data bases tend to deduplicate less.

Q. And so for those use cases, you need other data reduction technologies to save space, right, if you want to do data reduction?

A. That's correct.

Q. So, for example, with data base use cases, compression is the primary data reduction technology for those use cases, correct?

A. Compression is one of the technologies for that use case. It's not the only.

Q. Okay. But compression is certainly one that has a big benefit for data base use cases, correct?

A. Compression often has a 2 to 1 benefit.

Q. Okay. And for the first full year after it was generally released in 2013, XtremeIO did not have a compression data reduction feature, correct?

A. That's correct.

Q. Okay. And as we discussed yesterday, Mr. Cobb, EMC bought XtremeIO in May of 2012, right?

A. Yes.

Q. Yeah. And you testified yesterday that EMC was working with XtremeIO from about

2008 onwards; is that right?

A. Yes, that's right.

Q. Okay. And XtremeIO did not generally release its product for sale until November of 2013, right?

A. Yes, that's correct.

Q. Okay. So despite all the assistance that EMC provided XtremeIO that you described yesterday, it still took five years for XtremeIO to generally release a product, right?

A. Yes, that sounds about right.

Q. And after EMC acquired Xtreme IO in 2012, the delay in getting XtremeIO generally released caused senior executives within EMC to be concerned that XtremeIO was late to market, correct?

A. Yes, there was concern that the All-FlashArray market was developing more quickly than we expected.

Q. Would you turn to Exhibit 810 in the binder of exhibits before you?

A. All set.

Q. Okay. And is this an e-mail that

you received from Zahid Hussein on May 30, 2013?

A. Yes, it is.

MR. WERDEGAR: Okay. I would like to offer Exhibit 810 into evidence.

MS. DOMINGUEZ: No objection.

THE COURT: Thank you. Admitted without objection.

BY MR. WERDERGAR:

Q. And Mr. Hussein, at the time that he sent this e-mail out, was the head -- Mr. Hussein, at the time he sent this e-mail out, was the head of the Flash Products Group within EMC, correct?

A. That's correct.

Q. And one of Mr. Hussein's responsibilities was XtremeIO, correct?

A. Yes, that's right.

Q. Okay. Now, Mr. Hussein is forwarding to you and some others at EMC an e-mail from Josh Goldstein, correct?

A. Yes.

Q. Okay. And if we look at Mr. Goldstein's original e-mail that he sent on May 29, 2013, Mr. Goldstein wrote in his original

message, Pure Storage announced version 3.0 of the Purity operating system today, along with updated hardware. Do you see that?

A. Yes, I do.

Q. Okay. And at the time Mr. Goldstein sent his e-mail, XtremeIO did not yet have a product generally available, right?

A. That's correct. This was in May.

Q. Okay. And he writes in his e-mail, the changes of note are detailed below and we'll send a competitive bulletin to the field. However, amongst of the leadership team, I want to make sure to send a clear message that we are now 14 months behind Pure on features and while I believe our performance advantage still exists, its being progressively marginalized. Do you see that?

A. Yes, I do.

Q. And you understood at the time that this was coming from the head of marketing and product management for XtremeIO, right?

A. Yes, that was Josh's role.

Q. Yeah, those were the concerns he was expressing, correct?

A. Yes, he was representing product marketing concerns.

Q. Okay. And then he writes in his e-mail still, I know we are heads down for GA, and that's general availability, right?

A. Correct.

Q. And I know we are heads down for GA, but we have to begin a catch up and overtake plan. Our advantages won't matter to most accounts when we have a 14 plus month feature deficit and as Pure gains more market credibility and wins more accounts. Do you see that?

A. Yes, I do.

Q. And you understood that Mr. Goldstein, the head of product management and marketing for XtremeIO was proposing that EMC needed to begin a catch up and overtake plan to catch up with Pure, right?

A. Yes, that was his opinion.

Q. And it was his opinion as the head of marketing at product management for XtremeIO, right?

A. Yes, it was.

Q. Okay. Now -- oh, actually, let's just back up, because there's one more question there. Mr. Hussein, who is the head of the Flash Products Group, then writes back the next day, actually forwards Mr. Goldstein's message the next day to you and other executives at EMC, right?

A. That's correct, sir.

Q. Okay. And at that time Mr. Hussein wrote to you, like Josh, I'm increasingly concerned about how late XtremeIO is to market. So you understood when you received this, did you not, that Mr. Hussein, who is in charge of XtremeIO, was increasingly concerned about how late it was to market, right?

A. Yes, Mr. Hussein was understandably concerned.

Q. Mr. Cobb, EMC has a group within the company that prepares various forms of information concerning EMC's competitors in the marketplace; is that right?

A. Yes, sir, that function is performed in several areas.

Q. Okay. And one area is called the Competitive Intelligence Group, right?
A. That's correct.
Q. Okay. Could you turn to Exhibit 807 in your cross-examination binder, please?
A. Okay.
Q. Okay. And Exhibit 807 is a document entitled All-FlashArray competition, correct?
A. That's correct.
Q. And it's dated October 29, 2013?
A. Yes, sir.
Q. Okay. And this is the type of report that you normally would have received in your role at EMC, right?
A. Yes, it is.
Q. Okay. And you know the authors of this document Andy Watson and Brian Durick, right?
A. Yes, I do. I work with them often.
Q. And they're both contributors to EMC Competitive Intelligence Group; right?
A. Correct.

MR. WERDEGAR: I would like to offer Exhibit 807 into evidence.

MS. DOMINGUEZ: No objection.

THE COURT: Admitted without objection.

BY MR. WERDEGAR:

Q. Here is a the document and if we could go to page nine of this document. And this is a page entitled irresistible lure of VDI for AFA. And Mr. Cobb, VDI is a virtual desktop infrastructure?

A. That's correct.

Q. And that's one of the big use cases for all-Flash storage?

A. That was one of the initial targets for all storage was deduplication.

Q. And AFA stands for all-Flash array; is that right?

A. That's correct.

Q. And the Competitive Intelligence Group at EMC as of October 29, 2013 is stating that VDI is an insanely crowded Flash storage market. Do you see that?

A. Yes, I do.

Q. And then below that there is subbullet point the second one, the Competitive Intelligence Group reports all dedupe implementations have an obvious huge impact, therefore, relatively easy to go to market. Do you see that?

A. Yes.

Q. And, in fact, as of the date of this document, October of 2013, there existed in the storage market a number of different deduplication implementations; correct?

A. Yes, sir, that's correct.

Q. Now, if we could turn to page 32. And this is a portion of the report that's labeled key takeaways. Are you there yet, Mr. Cobb?

A. I'm just getting there.

Q. It's also on the screen in front of you. It's easier.

A. My eyesight, the printed page is much better. Thank you.

Q. Are you there now?

A. Yes, I am.

Q. And this is a page labeled key

takeaways?

A. Yes.

Q. And in the upper right-hand corner of this page is a label, insanely crowded market, competition will be fierce(r), and there is a little R in parentheses; right?

A. Correct.

Q. So did you understand -- strike that.

Was the conclusion that was being presented in this document by EMC's competitive intelligence team as of October 2013 that the market for VDI, one of the initial use cases was an insanely crowded market and competition would be fierce(r)?

A. Yes, everyone in the market aimed for VDI as their initial use case.

Q. Could we turn to page seven of the document.

And is this page, Mr. Cobb, a graphic prepared by EMC depicting that insanely crowded market as being described in the report?

A. Yes, it is.

MR. WERDEGAR: I have no further

questions. Thank you.

THE WITNESS: You're welcome.

THE COURT: Any redirect?

REDIRECT EXAMINATION

BY MS. DOMINGUEZ:

Q. Good morning, Mr. Cobb.

A. Good morning.

Q. Just now Mr. Werdegar asked you a series of questions about some concerns about the timing of XtremIO's launch. Do you recall that?

A. Yes, I do.

Q. And he showed you an email from some marketing folks talking about those concerns; right?

A. Right.

Q. As best you understand, does any of that have anything to do with whether Pure Storage uses EMC's patented technology?

MR. WERDEGAR: Objection. Leading, 701.

THE COURT: Overruled.

A. Sorry, could you restate the question?

Q. As best you understand, does any of what Mr. Werdegar asked you about have anything to do with whether Pure Storage uses EMC's patented technology?

A. No, it does not.

Q. Now, by the way, while some folks were obviously pushing as we saw to get XtremIO out into the market as son as possible. I want to understand what happened after it launched. Could you briefly explain?

A. We launched the product in mid November of 2013. We had a very good quarter, in just six weeks of selling, we progressed into 2014 and by the middle of 2014 we had gone from entering the market to being number one in the market.

Q. What is XtremIO's position in the market today?

A. Today it is still number one.

Q. Just so I understand, how long did it take for XtremIO to get to that position?

A. About three quarters.

MS. DOMINGUEZ: Thank you. I have nothing further.

THE COURT: All right. Thank you, Mr. Cobb. You may step down.

THE WITNESS: Thank you, Your Honor.

THE COURT: Mr. Krevitt.

MR. KREVITT: Yes, Your Honor. Our next witness is Dr. Kai Li, one of the inventors of the dedupe patent. If I can just step outside.

THE COURT: Okay.

KAI LI,

the deponent herein, having first been duly sworn on oath, was examined and testified as follows:

MR. KREVITT: We have some binders, Your Honor. May I approach?

THE COURT: Yes.

MR. KREVITT: May I proceed?

THE COURT: Yes.

DIRECT EXAMINATION

BY MR. KREVITT:

Q. Good morning, Dr. Li?

A. Good morning.

Q. Would you state your full name for the record and introduce yourself to the jury?

A. My name is Kai Li. I'm professor at Princeton University.

Q. How long have you been a professor at Princeton University?

A. I joined the faculty in 1986. Since then I have been faculty member.

Q. For the last thirty years?

A. Yes.

Q. And at some points along the way, did you take any breaks from teaching at Princeton University?

A. Yes. At the university, typically we are allowed to have sabbatical every six years. So I took a several sabbatical during this period of time.

Q. And we'll talk about one in a little bit. If I can ask you to turn to in the binder that I have provided, Dr. Li, to what's marked PTX-1.

MR. KREVITT: And Your Honor, if we could introduce this into evidence, it's the patent.

THE COURT: Right. Admitted without objection.

BY MR. KREVITT:

Q. Do you recognize what's been marked as -- if we could go to the next page. Maybe highlight that part.

Do you recognize this document?

A. Yes.

Q. What is it?

A. That's a patent we awarded when I was working at a startup called Data Domain.

Q. And it says Kai Li there. Is that you?

A. Yes, that's me.

Q. And this is the '464 patent?

A. Okay.

Q. And you understand that the '464 patent is one of the patents that's at issue in this case?

A. Yes, I understand.

Q. And if you would flip to PTX 3, it's the '015 patent?

MR. KREVITT: Your Honor, if we could have that introduced into evidence.

THE COURT: Admitted without objection.

MR. KREVITT: Thank you, Your Honor.

BY MR. KREVITT:

Q. If you could just make sure, Dr. Li, that you recognize this document as the '015 patent, the second patent at issue in this case?

A. Yes.

Q. And it says Kai Li, that's you?

A. Yes.

Q. As one of the inventors.

Now, I think you touched on this a moment ago, but the patent, if you go down a little bit says that Data Domain is the assignee?

A. Yes.

Q. And you had mentioned earlier that you were working at Data Domain when you took a sabbatical. When was that?

A. That was in 2001, when I was on sabbatical at Stanford University, and then I team up with two cofounders to start this

company.

Q. And let's just break that down for smaller pieces if we can. So the year was 2001, I think you mentioned Stanford, I hadn't heard anything about Stanford yet. Can you explain to the jury what you were doing at Stanford?

A. Initially I was on sabbatical at Stanford University. And during sabbatical typically we're supposed to take some time off, perhaps learn something new so we can return back to the university to start a new research program.

During that period of time, I was -- I met some friends who were interested in doing, asking me to help them with their startups, then I thought if I have time to do that, perhaps I should think about doing a startup myself, that's when I team up with the two other cofounders to start Data Domain.

So we start the company October 12th, 2001, which is one month after September 11th.

Q. And we'll talk more about Data Domain, but just briefly, sir, did Data Domain

make products?

A. Yes, Data Domain make what we currently call deduplication storage system products to protect data. Especially with focusing on backup data.

Q. And just to be clear, you said what we currently called, did the Data Domain product have a different name earlier when you had launched it?

A. Yes. I think the first product we call it is a, I think we changed a thousand times, we called restorer, meaning that you can restore data very quickly. We also called that, I think internally we called -- today we call deduplication, but back then we called global compression. I think a few years later market research firms start talking about this new market segment. They coined the name deduplication, then Data Domain follow that term. We thought it was a good terminology.

Q. And did all of Data Domain's products use deduplication?

A. Yes. The entire product line use deduplication.

Q. And how important was deduplication to Data Domain and its products?

A. That's the key technology for Data Domain product.

Q. Now, I probably should have asked this earlier, but just for the jury's benefit, can you give your, at a high level, your understanding of what deduplication is? When you talk about deduplication, what do you mean?

A. Right. Deduplication is a method to identify duplicate data segments and then in order to store unique segments, such that you can reduce the footprint of the storage dramatically. In the past if you're using typical compression tools on your laptop or desktop computer, they also identified duplicate data, except in a very small window, such as a hundred kilobytes or so. Back then when we call global compression or today we call deduplication is to make that window very large that in the entire storage system or the network of storage systems, you can find duplicate data, so you can avoid storing them, now you can find a lot more duplicate data. I think that's what

we refer to as deduplication today.

Q. How does deduplication relate to the patents that are at issue in the case, the patents that you just looked at?

A. I think to build a deduplication storage system, there are many challenges. So to solve this problem, to be able to build a commercial product that works well, you have to have innovations. I think those innovations represents some parts of the deduplication technology.

Q. You mean the innovations?

A. The innovation.

Q. That you developed at Data Domain?

A. Yes.

Q. And do all of the products that Data Domain sell incorporate the technology in the patents that we're talking about?

A. Yes.

Q. Let's take a step back. We jumped into deduplication quicker than I anticipated and just get a sense of who you are. Where did you grow up?

A. I was born and grew up in China.

Q. Where in China?

A. In the city called Chongqing, we call Manchuria in the US. It was the capitol of the country during World War II.

Q. And you went to college in China?

A. Yes, I went to university called Jiaotong University in the same province where I grew up. That university is a public school, large public school, sort of similar, if I used the analogy, it would be similar to University of Illinois, University of Wisconsin.

Q. And after your time in college, did you have further studies in China?

A. Yes. I went to Chinese Academy of Science for my master degree during which time I applied to the PhD programs in the US, then in 1981 I went to Yale University for my PhD study.

Q. After your studies in China you went to Yale for your PhD studies, is that what you said?

A. Yes.

Q. And that was in, I'm sorry, which year?

A. That's 1981.

Q. And was that your first time in the United States?

A. Yes, that was the first time to the United States, also the first time I got out of China.

Q. First time leaving China?

A. Yes.

Q. What led you to leave China at that time?

A. Well, for the better opportunity to study, for better education.

Q. And was that common for people in China to come and study in the United States at that time?

A. No. That wasn't common. I think this is after the so called revolution, that was the first time the government allows students to get out of China to study.

Q. So you go to Yale. It's your first time in the United States. What did you do -- you got a doctorate from Yale?

A. Yes.

Q. And then what happens after you graduated with your doctorate, what do you do?

A. I received my PhD degree in 1986 and then I joined Princeton University as a faculty member.

Q. And that's in sort of full circle that you've been there ever since?

A. Yes.

Q. And did you consider going back to China after you got your doctorate at Yale?

A. No. I think like many first immigrants, after receiving education in the US, you know, I felt I loved this country. This country gave the best opportunity for my career, also the best environment to create a family, so I stayed.

Q. So turning back to the patents, other than the two patents that we've talked about so far, the '015 and the '464 patents that are at issue in this case, are you an inventor on any other patents?

A. Yes, I have received numerous patents.

Q. Ballpark sense of them?

A. More than 20.

Q. And other than the patents that

you received, have you received other awards in your industry or other honors?

A. Yeah. Yes, numerous awards.

Q. You're going to be modest with me. Can you give the jury an example or two of the honors and awards that you've received in your career?

A. Yeah, probably the most prestigious one I was elected to National Academy of Engineering in 2012. And before that I was elected to IEEE and IEEE fellow and after that I was elected to be ACM fellow. Those are recognitions for the work I've done in the past.

Q. Okay. So let's take a step back now to the founding of Data Domain. I think you said that was in October of 2001?

A. Yes.

Q. Okay. So let's go back to that time. And you said that you had some co-founders?

A. Yes.

Q. Can you explain briefly who your co-founders were and how quickly you came together and formed Data Domain?

A. Yes. One of the co-founders, Ben Zhu, who I met several years before 2001, because he was a graduate student at Standford University and his advisor, Pat Hyrahan was a friend of mine. And we -- it happened also he was a roommate of Larry Page, who is now the -- who is one of the founders of Google. So in 2001, I first met him through the potential investor of one of the venture capitol first. And once we met we recognized we had already met before, so he wanted to work with me to start a new company. Another person is Brian Biles. He has expertise in product management. And he was -- his company was just fired so he was looking for an opportunity with other people to start up a company.

So the three of us, once we met, we sort of really enjoyed being together, and we spend more time every day. Eventually we decided to start a company.

Q. And during all of this time you remain a professor at Princeton?

A. That was during my is sabbatical. During sabbatical the university actually pay

your salary because for you to learn something new. But when I knew I was about -- was thinking about doing a start up, I actually informed the university stop paying my salary, so -- to avoid potential conflict of interest and I would -- so I was on no pay leave from the university.

Q. So explain for the jury when you and your founders come together what the mission of Data Domain was. What was the purpose you all set out to pursue?

A. Our mission was to replace tape library data centers. The reason we were thinking about doing that, because at the time as many of you probably remember, the music cassette tapes were replaced by MP3 players and ipods. And VHS videotapes were being replaced by DVR and TiVo's at the time. So tapes were very difficult to use and people at the data center had the similar problem, but no one was able to build a product to replace them, so we thought that would be a good opportunity for us to build some product to replace tape library in data centers.

Q. If tape library weren't great, you wanted to replace them, why were they so widely used?

A. Well, tape media, as many of you know, are inexpensive comparing with magnetic disk drives, so people, they produce a lot of backup data, because typical data center you do a back up every day, the incremental back up, back up all the files have been changed, but on a weekly basis typically you do a full back up, back up the whole data, all the data you have in the server, and so that consume a lot of media, and tapes are inexpensive, therefore data centers would prefer using tapes. Another reason is to move tape to the this side for disaster recovery like earthquake or something like September 11 so you can get your data back and they have been using this for this way for decades, so -- but you have problem, many problems, for example, you want to find the data, you have to find the tape first, and you also need to rewind the tape to find where the data is.

Tape media are also not so

reliable. Sometimes when we write data into it, by the time you read the data, you may not be able to read it back reliably.

So we have Data Domain recruit some people from Erta Mountain, that's the largest company for remote data transfer, and they told us that often they cannot find customers' tape because the tape placement are based on bar code and human produce errors. Their statistics is that about ten percent of the time they couldn't find the tapes. So there is a lot of issues with tape.

Q. Just so I understand, and the jury understands that you described some quality issues with tape, but at the end, you said that it also gets lost. And you say that a company that stores that told you that ten percent of the time, tape just can't be found?

A. Yes. Also, I think in early 2000, California passed a law saying that any -- if you are a company and if you lose data of California residents, you have to provide that information to the public domain, disclose that information. So, therefore, since year -- since

that time, we saw a lot of article about, Bank of America lost 600,000 customer information during the backup data transfer.

When they transfer tape, sometimes they just lost, they couldn't find, and that information would be exposed, it's compromised.

Q. So with the significant problems associated with tape that you explained to the jury and disks existed, why in the backup storage that you were focused on didn't everyone just use disks?

A. Right. First of all, disks, magnetic disk drives always cost a lot more than tape by several factor, like around factor of five at the time. So you would have to make that decision, if you just used the straightforward way to store data on disks, it would cost data center, an increase of the cost dramatically.

In order to compete, similar to iPod or DVR players, you would have to have special compression to shrink the footprint such that using disk space as storage would be competitive in price, but better in many other

-- you have other good, so that's the challenge. You have to be able the create a new kind of a compression that can dramatically shrink the data footprint in order to have disk replace tape, that's what we set out to do as a startup company.

Q. That's what Data Domain set out to do to replace tape with disks?

A. Right.

Q. And what were those -- you start in October of 2001, what were those first months like if you could explain to the jury, what was that like being in that startup for you?

A. Well, I think life in startup, it's always exciting, but very time consuming. We were just very busy working. And typically we worked fourteen hours a day and the weekends. And we worked in that way for a long time.

Q. And did Data Domain, did you and your colleagues find a solution to the problem to be able to move from tape to disk?

A. Yes. I think a few months after we start a company, we came up with the idea, I think today people called it deduplication

storage technology, and based on that we start building our product line.

Q. And did Data Domain succeed in developing the deduplication technology, the new deduplication technology to be able to move from tape to disk?

A. Yes. We were able to do that. And I think in 2006, Data Domain product line revenue exceeded the tape revenue, that means we won the war on replacing tape.

Q. Let's just follow-up on that. When did the first Data Domain product launch?

A. It was in 2004.

Q. 2004. And within a year or say, what market share did Data Domain have?

A. Well, initially I think people were not -- there was no deduplication storage product segment. Data Domain was the company that introduced the deduplication storage product into the marketplace.

I think the first year we had a revenue of 8 million, and then quickly increased to 40 million, then over a hundred million, then 200 and 500, and then over a billion in revenue.

Q. So for us, we don't get to a billion so quickly, so if we could slow that down. So you said you were at 8 million?

A. Right.

Q. Was that the first year after launch?

A. Right.

Q. You can explain it, but maybe if you slow it down and just give the jury a sense of the timing of how you got to, I think you said 40 million or whatever the right numbers are, if we could explain to the jury what the trajectory is to get to that revenue for the Data Domain products?

A. I'm not sure what you meant.

Q. I'm not either.

So I just want -- you gave several numbers, and so that just so the record is clear, the first year of Data Domain revenue was about $8 million?

A. Yes.

Q. And the second year of revenue?

A. It was -- the second after that I think was over 20 million, if my memory is

correct, it was around 27 million. And then it went to 46 million.

Q. The next year?

A. Yeah. And then to 127 million. Then to I believe after that was the year -- so that was at 250 million, and then 570.

Q. Do you remember what year was 250 million?

A. That was 2006.

Q. So just a couple of years after launching the product?

A. Yeah. Uh-huh.

Q. And then it doubled to 500 million?

A. No, I'm sorry. I need to get back, take it back. I think the year of 2007 was 127, that was the year we went public. The year after that is 250. Then in 2009 was 570, that was the year EMC acquired Data Domain.

Q. And then when did it go to a billion dollars in revenue?

A. The year after that acquisition, 2010 it went to 1.1 billion.

Q. Do you know how the revenue of the

Data Domain product has continued since then?

A. Yes. The year after that, it was one point -- over 1.5 billion, then 1.8 billion, then over two billion for the rest of the years. So in total Data Domain product line has generated over ten billion revenue. And the gross margin is around over 75 percent. I think the last two years was over 80 percent. I think EMC is charging too much money, but --

Q. Objection.

A. I wish it was a little lower.

Q. And just for the benefit of everybody here, what do you mean when you say gross margins in that context?

A. Gross margin is the -- let's say you have a hundred dollars of revenue, then the cost of making the product is 25 percent. Then the cost is $25. And the 75 -- in this case, gross margin is 75 percent.

Q. And just following this through, do you have a sense of what Data Domain's market share was in those years?

A. I think since the market research community defined the segment of deduplication

storage, Data Domain product line, has always had more than 60 percent of the market share.

Q. 60 percent?

A. 60 percent, yeah.

Q. And those revenues are all attributable to the Data Domain deduplication products?

A. Yes.

Q. And all of those products incorporate the '015 and '464 patents we have been talking about?

A. Yes.

Q. So let's get back to deduplication and you're working fourteen hour days on the startup in the early months, and how quickly did you and your founders, your colleagues develop the idea to use deduplication?

A. I think -- the complete set of ideas or the technology, or invention, whatever you call it, that we had altogether was in February 2002.

Q. So from October to February, October 0 one to February 2002?

A. Yes.

Q. Let me ask you a question if we step back. Did you, Dr. Li, invent deduplication, the concept of deduplication?

A. Well, I would say no, because deduplication, the concept, has been around since we start doing compression, back in the '70s. Because if you run those compression tools, they're trying to identify and duplicate data, so you call that deduplication, then that concept has been around for a long time.

I think what we have is how to build deduplication storage system, that was new, that was new at the time.

Q. And is that what you invented and put in your patents?

A. Yes. I think the aspect -- yeah, in this patent, in the two patents, I think what we have is how to build a disk storage system that can run fast and that can achieve low cost, and that's how we can use the product to replace tape backup.

Q. And you developed new and specific techniques to use deduplication in order to accomplish that move from tape to disk?

A. I wouldn't say use, I would say we invent new ways to implement or to make deduplication storage part.

Q. Can you just at a very high level describe what those -- what you understood to be your new techniques and new inventions? If I may, I know the patent sets out your invention, I'm not asking you to read your patent, but for the jury, at the highest level, what you understood you had come up with?

A. Yes. So the challenge of building deduplication storage system to replace tape is that I think I'm trying to simplify the description.

So one thing you have to accomplish is that to reduce the cost, as I mentioned before, disk, magnetic disk media typically cost several times more expensive than tapes. So we have to shrink data footprint, we have to have a compression ratio much higher than the cost factor.

Let's say it cost more than a factor, cost more than factor of five comparing with tape library, and the compression ratio has

to be greater than five in order to break even. So we want to achieve very high compression ratio.

The other thing is there is also another cost in it which is you need to have a server inside a storage box in order to perform the compression, so that cost has to be reduced, too, in the same formula. I think the most technical challenge is the speed of moving data. The reason is that every day when we back up data, data center only has a few hours, for example from midnight to four o'clock in the morning, four hours, and this is a time you don't have users.

But the data growth rate is very high. The data keeps growing. Actually the data growth rate, we call it the Moore Curve, Gordon Moore, Intel founder, predicted that the network transistors on various chips would double every eighteen months or so, so then in the industry, we called that Moore Law. We applied Moore Law to data growth rate to CPU performance to many, many things.

So that basically means that the

data grows by a factor of ten every five years.

So that means that you know, if we only have four hours to move data to back up devices, our through put has to increase by a factor of ten every five years. So that's one of the challenges.

But meanwhile you want to reduce costs, therefore you can't use expensive storage to test whether which data is redundant, so you have to use very little other resources, such as DRAM to hold information in order to test. Without looking at data restored in data media to decide which piece of data you already have or currently you have the same data, so you can identify which data is redundant.

So this, I think this one of the patents, probably the '015 Patent talk about how to use a data structure, very compact structure and how to, describe the algorithm, how to use that method to decide which data is duplicate and which one is not duplicate, then we can achieve the compression. So in the end, I think we typically can get compression ratio by a factor of 20 to 30, because in back up in the

entire storage there's a lot of redundant data we can find. That is -- that's how we can build product, so this process is difficult because of what I described.

Q. The inventions that you and your colleagues came up with and put in the '015 and '464 Patent solve those issues?

A. Yes, we proved that we solve the issues by shipping those products and customers, users have seen what the products can do.

Q. You're referring to the revenue, the fact that there were so many sales of the products?

A. Not only the revenue, but also we have the auto support data coming back from the customer showing us what compression ratio they achieve.

Q. And you use the term compression numerous times. I believe in this context you're using compression to mean deduplication; is that right?

A. Well, deduplication -- the definition of deduplication is a little vague, because in our product in addition to

identifying which data segments are redundant, we also apply the so-called local compression on the unique segments before we store it to the data. So it's a combined approach and when we say compression ratio, total compression ratio, we mean the compound of the compression of deduplication and local compression together.

Q. And when you said you achieved 20 to 30 X?

A. Yes.

Q. What do you mean by that?

A. That means that if I have 20 megabytes of data, then I only need to consume 1 megabytes of storage.

Q. You reduced the data by that much?

A. By that factor, yeah.

Q. So let me ask you a few questions about when you came up with the ideas that you and your colleagues put in the patents, in the '015 and the '464 patents. Do you remember with precision a date by which you had conceived of, thought of the ideas that you put in your patents?

A. Yeah. With my co-founder Ben Zhu,

we had a lot of discussions. This is before, before we start recruiting other people. I think -- on the day we put all the ideas together that we understood how to make such product was in February. The reason we remember it was in February, was that we -- I wrote a lot of discussions on a white board and we had a tradition of taking white board, using digital camera to take white board shots as a record of our discussion. I had a digital camera at the time that -- you know, cell phones didn't have cameras at the time, so when I was told that there was a patent litigation going on I immediately, you know, remembered I had those white board shots, so I found those. Those were taken in February. In fact, these screen -- the first screenshot at the time I named the file February 13, 2002. We also remember -- I remember that Hugo Patterson, who was the co-inventor of the patent, he joined Data Domain within a week after he received his offer letter. I found his offer letter dated February 25 the of 2002. Then another person --

MR. VAN NEST: Objection, Your

Honor. Move to strike.

THE COURT: All right. The last sentence, Mr. Krevitt, you agree, right?

MR. KREVITT: I don't -- I don't necessarily.

THE COURT: All right. Come over to side bar.

(Side bar discussion.)

THE COURT: So he referred to finding the offer letter, which I think is one of the documents that I struck, right?

MR. KREVITT: I confess I don't know -- I didn't think it was, but it may well have been. I would need to find out.

MR. VAN NEST: It is.

MR. KREVITT: Or I can take his representation.

MR. VAN NEST: It's stricken.

MR. KREVITT: You struck the document, but if he has an independent recollection of it --

THE COURT: How could he possibly?

MR. KREVITT: I think he absolutely does.

THE COURT: He just said I found the letter or saw the letter.

MR. KREVITT: Can I ask that question, aside from the letter -- in other words --

THE COURT: It's actually just not plausible that he remembers the date of a letter when we know he saw the letter.

MR. KREVITT: I don't mean that. I mean by when Mr. Patterson joined the company.

THE COURT: You can ask him that, you've said that all along.

MR. KREVITT: Okay.

MR. VAN NEST: We're going to instruct the jury that this reference to the offer letter and the date will be stricken?

THE COURT: Right.

MR. VAN NEST: Yeah, okay.

THE COURT: Okay.

MR. VAN NEST: He can talk about if he remembers when Patterson joined as long as it's separate from the offer letter.

MR. KREVITT: I don't know that it instruction is necessary, Your Honor, at this

time.

THE COURT: Well, I mean, he's referred to something I struck, so I'm going to give -- tell them, actually, I think -- you know.

MR. KREVITT: I actually didn't expect the witness to refer to the offer letter, that's why I didn't look back to -- just one thing. I just wouldn't -- so he volunteered it, and I am concerned that there is going to be an instruction that makes it seem like we did something that we shouldn't be doing, when --

THE COURT: You know, I'm not concerned with why they think it was struck. I'm concerned what kind of follow up question you think you can ask that won't --

MR. VAN NEST: Evoke this.

THE COURT: Yeah, something like that.

MR. KREVITT: Why can't I ask explicitly, independent of any letter, correspondence, just from your own memory and recollection?

MR. VAN NEST: Your Honor, if you

struck the question and answer, which I think you're intending to do --

THE COURT: The problem is the answer was sort of narrow which he was doing a bunch of things. The question was fine. I think.

MR. KREVITT: I did not refer to a letter, I can assure you of that.

MR. VAN NEST: So, I'm concerned that just about any question about when Mr. Patterson started, given that he's now reviewed the letter and now reread it, to give him the date is going to be tainted by that. So I'm not sure what question he could ask that would be appropriate.

THE COURT: And that's kind of my concern is you can't actually -- I mean, if you ask him do you remember when Mr. Patterson started, he'd probably say, yeah, it was about a week after February 23rd or whatever date of that letter he just said. So in terms of verifying or corroborating go his testimony, I don't know how him saying well, Mr. Patterson started when, actually he's going to do that

anyhow. So why don't we just skip that?

MR. KREVITT: I can tell you if you're interested.

THE COURT: Okay. Tell me.

MR. KREVITT: This is what he's told us. We ask him how do you know that you came up with your ideas by a certain date? One of the things he said from the start, I understand he found documents later, was that he had done these white board drawings before Mr. Patterson started. That's how I can situate them in time.

THE COURT: But when you're asking the white board date, I thought the white board drawings had some kind of date that was associated with them.

MR. VAN NEST: One does.

MR. KREVITT: They all do.

THE COURT: So that saying I know -- so the point is when trying to get some kind of corroboration of what he's saying --

MR. KREVITT: We'll move on. I'll move on.

THE COURT: Okay.

THE COURT: All right. Members of the jury, Dr. Li, actually I'm just going to strike his entire answer to the last question, so I'm going to ask you to disregard it. I would ask Mr. Krevitt to try to ask another question. All right.

BY MR. KREVITT:

Q. So I want to go back to how you know that you conceived of your inventions in the February time frame, and you were talking about your whiteboard photos.

A. Yes.

Q. I want to ask you some follow-up questions about that. And I'm not interested in how they may have related to other people joining the company, I just want to understand your understanding of the whiteboard photos and why they're relevant to you in terms of when you conceived of all the ideas that are in your patent. So let's -- why don't we start there.

You were talking about these whiteboard photos that you prepared. How did those whiteboard photos, drawings, confirm for you that you had conceived of your inventions in

that time period?

A. Well, the whiteboard photos is important because that white board discussion -- we actually left the whiteboard writing for quite a while because that captured the key inventions that eventually went into the patent.

Q. Why don't we look at, start looking at the whiteboard photographs. And why don't we pull up -- I think you had said that one file name was mid-February; is that right?

A. Yeah.

Q. Let's pull up PTX 9. And can you tell the jury, it's obviously hard for us all to read, but can you tell the jury what we're looking at?

A. Right. So I think this is in the upper left corner it talks about the cache container of a table which described cache table size and also what are the procedures needed to access this data structure.

Then following that is a map showing how to identify using a summary data structure to identify which -- what data is new, what data segments are duplicates.

Then there is a big table, that's the entire table that has all the information that's in the middle called global hash table. This described the data structure as well as how to access them, as well as how to even make an update, how to achieve high performance.

You can see there is also some parameters, and also on the right-hand side there is some configuration how to build, what parameters we are thinking about using, what we estimated how the performance of such a data structure.

So many of the data structure, even the parameters are still used in the current product line.

Q. Does this whiteboard photograph confirm that at the time that you prepared the actual drawings, you had conceived of all the inventions that are in the claims that we're talking about in the '015 and the '464 patent?

MR. VAN NEST: Objection, Your Honor. Leading.

THE COURT: I would ask that you rephrase the question, Mr. Krevitt.

BY MR. KREVITT:

Q. What does this photograph tell you about the relationship of when you prepared this whiteboard drawing to when you had conceived of all the ideas in the claims of the '015 and '464 patent?

A. The invention that happened is essentially from this drawing.

Q. Does that mean that you had conceived of the ideas at the time this was prepared?

A. Yes.

Q. And you said that you took photographs of the whiteboard; is that right?

A. Yes.

Q. And are you familiar with the concept of metadata?

A. Yes. Those are the description of about when, how, and information about the photos created by the camera.

Q. Created by the?

A. By the camera.

Q. The photograph that was taken of this whiteboard, who took it?

A. I took it.
Q. If we could pull up the metadata. Is this the metadata that you referred to that describes when the photograph was taken and how?
A. Yes.
Q. And what is the date that is identified as the date that the photograph of the whiteboard that has your invention was taken?
A. Well, the date here is February 27th, 2002. The name of the file, I gave was February 3th, 2002. I think I named the file because that was the date of the writing on the board. I believe that February 27 was the day I took the photo.
Q. So just make -- you named the file that you put the photograph in February 13?
A. Yeah. This particular file, I named February 13.
Q. And you think that's because that's the date you actually did the drawings?
A. Yes.
Q. But this date, February 27th, that's the date that you then take the

photograph of the drawings?
A. Yes.
Q. If we turn to PTX 10. I'm not going to ask you to describe everything on the whiteboard, Dr. Li. But is this another -- maybe if you could just tell the jury what this is?
A. Yes. This is a, part of the architecture design to implement the invention into a product. This is a COS, means compress object store.
Q. And so does this also confirm that you had conceived of your inventions by the time you did this drawing?
A. Yes.
Q. And why don't we look at the metadata for this photograph, again, which is the date the picture was taken. Can you tell us what the date of the picture?
A. That's March 20th, 2002.
Q. March 20, 2002.
That means that the photograph was taken on that date?
A. Right.

Q. Does that mean that you did the drawings on that date?
A. No. That means that the drawing has to be done before the photo was taken.
Q. So no later than that date, maybe earlier?
A. No later than that date.
Q. And if we flip to just one more, PTX 11, and again, not asking you to go through in detail, but does this whiteboard like the others relate to the deduplication inventions in your patent, your patents, excuse me?
A. Yes. This one is to describe the function of, particularly the future and also the analysis of how many bits you need per entry, so we did some contemplation on the whiteboard. This is my handwriting.
Q. Are all the white boards your handwriting?
A. Yes.
Q. Let's just look at the metadata for completeness on this one. What is the date of this one?
A. This is also March 20, 2002.

Q. Do you remember taking the photographs?

A. Yes, it was my digital camera. I don't have it in the office, but once in a while I bring the camera in, I would take photos as a record.

Q. And why did you take the photos?

A. Well, it's a more efficient way to archive the discussions. And also later we could use to remind ourselves what we had discussed before.

MR. KREVITT: Your Honor, we move PTX 9, 10 and 11 into evidence.

MR. VAN NEST: No objection, Your Honor.

THE COURT: All right. Admitted without objection.

BY MR. KREVITT:

Q. Let me show you another document, Dr. Li, or ask you to flip to in your binder. It's PTX 8. So it comes right before the whiteboard photos we were just looking at.

A. Yes.

Q. Do you recognize this document?

A. Yes, I do. I wrote this document.

Q. And what is an architectural specification?

A. Architectural specification is the document describing the product architecture, and also document the technology used in the product.

Q. And was the architectural specification we're looking at here, does that reflect your inventions and indicate that you had conceived of your inventions by the time you wrote the architectural specification?

A. Yes. The standard practice we develop a technology and we want to use the technology in the product, we will write a specification. In fact, we'll write two specifications, one is the architectural specification, the other is a functional specification, based on both of the engineers would be able to implement that particular design.

But in this case, this is a global design, the top design. Then the product will be divided into modules, then for each module,

we'll have to write an architectural specification and the functional specification so you know what to implement, how to implement and also what to test later, that way you put everything together and it will work.

This one is essentially follow the whiteboard discussion document, what ideas would go into -- based on your discussion would go into the product.

Q. Were those the same ideas that you conceived that went into the patents?

A. Right. Yes.

Q. And would you sit down to write an architectural specification before you had conceived of your inventions that you put in your patents?

A. No. You can't write a specification without the invention. You have to have the invention in place before you write a specification. In fact, in many cases, this is not just Data Domain, but standard practice in most of the companies. You need to validate your ideas by either using mathematics or by implementing prototype and work with running

with workload before you start writing specification, otherwise it will be a waste of time.

Q. There are two dates on this architectural specification, March 16, 2002 and April 3, 2002?

A. Right.

Q. Can you explain what those dates mean?

A. Well, in this case, March 16, 2002 was the first draft. Then that was named the version 0.1. 0.1 one is this particular version, that's the vision, and released in April, on April 3rd, 2002.

Q. And did you look for the March 16 document?

A. I couldn't find that document. I did look.

Q. And are you able to say how significant or what the nature of any changes may have been between the March 16 document and the April 3rd document?

A. Well, based on the -- our convention, versioning convention, the change is

minor. The reason is that typically before the dot, that mark the main version, but in this case we're using zero as the first draft. In some cases, I think -- in some companies typically you use 1 as the first draft. In this case that's the main version, then the digit after the dot is the -- are the changes since the first version. Then the second digit after that is a minor change. That's our convention. I'm pretty sure it's minor changes since then. Also -- what described in this document are what I described in the white board -- the screen shots.

Q. In the white board photographs?

A. Yes. So I'm certain that the version March 16 document, the idea is white boards too.

Q. So just to be clear, what you're saying, are you absolutely certain based on the white board photos and this document and just your own recollection that by March 16 you had conceived of all the inventions in the claims in the patent in this case?

A. Yes.

Q. Now, after you conceived of the inventions and you created the March 16 architectural specification, what did the company focus on next?

A. The company, we -- on several things in parallel. One is to immediately build a prototype, based on the invention and we convinced three data centers to run -- their work load. Actually we deployed the prototype into three data centers. Then meanwhile we're designing the rest of the pieces, right, then build a purer version 1 of the product. So we were very busy working on those.

Q. What was that time like for you in those months after you conceived of the invention or were working hard?

A. Yeah, just extremely busy. I think -- I think after that, after working very hard to build the product line and developing the market and so on and so forth, looking back was very interesting, but at the time it was very difficult for most people, just because we -- we worked very hard. As I mentioned before, we typically worked 14 hours a day.

Q. And was that for months on end?

A. No. No. For the first two or three years, I think we were working like that.

Q. And if I can ask you --

MR. KREVITT: First, Your Honor, if I can move into evidence PTX-8, the architectural specification.

MR. VAN NEST: No objection, Your Honor.

THE COURT: Admitted without objection.

BY MR. KREVITT:

Q. And if you could look, Doctor Li, and I'm going to speed it along, if you could look through, I'm going to give you some numbers, 49 and 50.

A. Where are you looking at?

Q. They should be in your binder.

A. 49. Oh, in the back.

Q. I'm sorry, yes.

A. Okay. Yes.

Q. I'm not going to ask you specific questions about these documents, but I do want to make sure -- I just want to ask you what they

are, so 49, 50, 51, 55, 57.

A. Right.

Q. 59 and 62.

A. Yes.

Q. 63 and 65. And then 66, 67 and 68. And if you could just tell me if you recognize these documents?

A. Yes, I recognize them.

Q. And what are they, just again?

A. These are the architectural and the functional specification I mentioned before for each main module in the product.

Q. And those documents that have dates ranging from May of 2002 to December of 2002, does that refresh your recollection as to the time frame within which you were working that hard to build your product?

A. Yes.

MR. KREVITT: Your Honor, I would move to have those, all of those documents admitted into evidence, please.

MR. VAN NEST: No objection, Your Honor.

THE COURT: All right. All

admitted without objection.

BY MR. KREVITT:

Q. Now, finally at some point earlier you said that Data Domain went public?

A. Yes.

Q. Do you remember the year?

A. It's 2007.

Q. And when Data Domain went public, what was its stock ticker symbol? What was the symbol that goes across to the ticker?

A. It was DDUP for dedupe.

Q. For deduplication?

A. Yeah.

MR. KREVITT: Thank you very much, Doctor Li. I have no further questions, Your Honor.

THE WITNESS: Thank you.

THE COURT: All right. Why don't we take our morning break right now for 15 minutes. Can we take the jury out please.

MR. KREVITT: Do you want Doctor Li to stay there?

THE COURT: Doctor Li, you can step down and take a break. Is there anything

you want to discuss?

MR. KREVITT: No, sir.

MR. VAN NEST: I don't think so, Your Honor.

THE COURT: All right. We'll be back in 15 minutes.

THE COURT: All right. Are we ready to resume? Dr. Li.

MR. KREVITT: We're missing Dr. Li.

MR. VAN NEST: Would you like a witness binder now, Your Honor?

THE COURT: Sure.

All right. Let's get the jury in.

MR. KREVITT: Your Honor, I am very sorry, I just flipped open the witness binder, and I know we're going to have a very serious objection to the very first exhibit. We can do that if Mr. Van Nest gets to it or we can do it now. It may just make sense to do it.

In the witness binder flipping to it has the very first exhibit is prior art. I don't want to do it in front of the jury.

THE COURT: All right. Hold them

up.

MR. KREVITT: I'm sorry. The very first -- I have only flipped to the first, I don't know if any other prior art is in here, but the very first exhibit is one of Pure Storage's anticipation references, the Venti reference, which presumably they're going to try to question Dr. Li on, which is -- there is lots of case law on this, it's highly improper. He's not an expert.

THE COURT: Of course the problem is I don't really know what questions they're going to ask. What are you going to ask, Mr. Van Nest?

MR. VAN NEST: It's going to be very brief and it goes to this whole idea of conception. All I want to establish is that Dr. Li attended the conference in January where this paper was presented. He saw the presentation, he read the paper. And just very briefly outline not in any detail, but the subject was a paper on deduplication storage. He's mentioned it --

THE COURT: What is the point of

this?

MR. VAN NEST: The point of this is that this paper was well-known and this presentation was well-known and it was out there and even the inventor saw it a month before he said he conceived his invention. It is one of our prior art references. I'm not going to go into the details, but I want to establish that it was well-known and out there.

MR. KREVITT: Your Honor we stipulated to its authenticity and its availability.

THE COURT: Well, Mr. Van Nest --

MR. VAN NEST: There is no question that it's authentic, but I think that it's significant that one of the inventors was present when it was presented and read it, saw it --

THE COURT: So I guess what I'm wondering, it's not going to be challenged on authenticity, I'm sort of okay with asking just as a matter of fact whether he was at this convention, you know, was familiar with the paper. But I'm not really sure why -- what else

--

MR. VAN NEST: I just want to establish through him just by looking at the title in the abstract that it's about a data storage system, and deduplication in that system. That's basically it.

MR. KREVITT: Your Honor, that's exactly what he shouldn't be doing with this witness. This is a Pure anticipation case now. The only thing that's relevant is what is in the four corners of the document. The fact that Mr. Li may have been there and heard is highly irrelevant and prejudicial.

THE COURT: Well, I mean, I guess that's what I'm concerned about, because it sounds like you're trying to plant the seed that he copied this.

MR. VAN NEST: No.

MR. KREVITT: There is no inequitable conduct in this case.

MR. VAN NEST: I'm not intending to suggest or plant it, I'm intending to suggest that at the time that he came up with his invention, others were working on the same

problem, at or around the same time, and that one of those others was the Venti system that was discussed in a big group of professionals in late January. That's all.

THE COURT: All right. Well, I'm going to -- I think there is some relevance to what Mr. Van Nest says, so I'm going to allow him to do it. But there shouldn't be any technical questions. Basically he should identify the article and let your experts talk to the technical stuff.

MR. VAN NEST: I will. I'll identify, I would like to display it so we can confirm what it is.

THE COURT: I have no problem with showing the cover page.

MR. KREVITT: Your Honor, our concern here is knowledge is not an element of anticipation. And none of this was disclosed in an invalidity contention. And it is designed obviously, there is no other reason given that we have stipulated to its availability and authenticity to create in the jury's mind that Dr. Li was aware of certain prior art and

Mr. Van Nest said in opening statement, none of the prior art was disclosed to the patent office. We are creating subtext of inequitable conduct claim which is entirely irrelevant. It has zero relevance to anticipation.

THE COURT: I don't think I'll hear that. If I here hear that, I'll be very upset. So I'm going to let him do it.

MR. VAN NEST: Thank you, Your Honor.

THE COURT: All right. Let's get the jury in.

(Jury entering the courtroom at 11:14 a.m.)

THE COURT: All right. Members of the jury, welcome back. Everyone, you may be seated.

Mr. Van Nest, you may proceed. Dr. Li, you may be seated.

MR. VAN NEST: Thank you, Your Honor. May I approach Dr. Li with a witness binder?

THE COURT: Yes.

MR. VAN NEST: Thank you.

CROSS-EXAMINATION

BY MR. VAN NEST:

Q. Good morning, Dr. Li.

A. Good morning.

Q. Dr. Li, you were one of the cofounders of Data Domain; correct?

A. Yes.

Q. And I believe you said you briefly served as the CEO of the company for a couple of months?

A. About two months.

Q. And after that, you became the chief technical officer?

A. Yes.

Q. And you served in that position all the way up until the time that EMC acquired the company?

A. No. When I -- in 2004 I returned back to university teaching and doing research, and also around 2006, I was sick, so I took some medical leave. Doctor contribute that to too much work during the startup days.

Q. Fair enough. In any event, as a founder, you own stock in Data Domain?

A. Yes.
Q. And that stock went public at some point?
A. Yes.
Q. And then EMC acquired the stock when it bought Data Domain?
A. Yes.
Q. And at that point, you made a great deal of money in connection with that acquisition; correct?
A. Yes.
Q. And then after Data Domain was acquired, you served on the technical board of EMC?
A. Yes.
Q. The technical board meets a few times a year to discuss technology?
A. Yes.
Q. And for that you were also paid at the rate of about $15,000 a year?
A. Yes. In my contract expired April 2015.
Q. So you served in that position from 2009 to 2015, and were paid that salary

each year; correct?
A. Yes.
Q. And then in addition, as a member of the technical advisory board, you also got stock in EMC; right?
A. Very few, but some.
Q. But you got shares?
A. Yes.
Q. And they have gone up in value over time?
A. Yes.
Q. As a matter of fact, you are being paid as a consultant in this litigation as well; right?
A. I was paid to look for materials, not for deposition or as a witness.
Q. You were paid at the rate of $475 an hour to search for documents?
A. Right.
Q. And also to work with the lawyers?
A. Yes. But my rate, that's very low, much lower than my typical rate for consulting.
Q. But again, that rate was paid in

the course of your work in this case, working with the lawyers for EMC, searching for documents, and that sort of thing; correct?

A. Right. Looking for documents, yes.

Q. Now, when you started Data Domain, you were trying to replace tape system with disk drive; correct?

A. Right.

Q. And I think you said the focus of Data Domain was on the backup market?

A. Yes. That was the focus.

Q. Backup storage as opposed to the primary market, is that what you meant?

A. Well, actually viewed several kinds of products in the product line, backup was just one of them. We also had product for storing archival data, we called archiver. And also we were sell the line and internally we also have a project Flash memory product using deduplication storage even though that was never shipped.

Q. Let's unpack that. I take it the primary market, the market in which Data Domain

has had success is the backup market?
A. That's the primary market, yes.
Q. And you understand -- well, strike that.
And the Data Domain products that have had the success, they all use mechanical spinning disks; right?
A. Mechanical, magnetic disk drives are the primary media, but we have other storage components in the system.
Q. But you understand this case is about the transition from disk to Flash; right?
A. What do you mean?
Q. This lawsuit is about the transition from disk drive to Flash technology, you understand that, Dr. Li; right?
A. I'm not sure what you talking about. I thought this lawsuit was a transition of the product.
Q. Now, I take it Data Domain never was able to commercialize a Flash product, right?
A. Did not commercialize the Flash product.

Q. Right. You had a project to try to build Flash, but eventually you killed that project, correct?

A. I don't know what happened, because I was no longer with Data Domain.

Q. But in any event you're aware that Data Domain never was able to commercialize a product in the All-Flash market, right?

A. I'm not aware.

Q. Okay. Now, and there's no mention at all of Flash in either of the '464 or the '015 patents, right?

A. Yes, not mentioned.

Q. Those patents were developed in the days when mechanical disk was the primary storage means, correct?

A. I'm not sure what you mean. There are many forms of media.

Q. Let me move on, Doctor Li.

A. Yeah.

Q. Now, you continued serving on the technical advisory board at EMC right up until April of last year, correct?

A. Right.

Q. And after 2009, EMC had acquired all of your patents and all of the Data Domain technology, correct?

A. Yes.

Q. Now, did you become aware through your position on the technical advisory board that EMC went out and bought another company, namely XtremeIO to get into the Flash market?

MR. KREVITT: Objection, Your Honor. Foundation and outside the scope of my direct examination. Obviously I didn't touch on any of those.

MR. VAN NEST: I asked him whether he knew it, Your Honor. I'm trying to find out.

THE COURT: Well, I'm going to overrule the objection. Go ahead.

BY MR. VAN NEST:

Q. I'll ask it again, Doctor Li.

A. Okay.

Q. And that is did you become aware?

A. Yes, I'm aware.

Q. Okay. So even though EMC had possession of all of the Data Domain technology, they went out and bought a different company

with different technology to enter the Flash market, correct?

A. I don't know how EMC works in terms of acquiring company. I can't --

Q. Well, you're certainly aware that in order to enter the Flash market one of the things EMC did was purchase XtremeIO and eventually commercialize their product?

A. EMC also bought SSD company, also.

Q. So they maybe acquired yet another company. What company is that called, DSSD?

A. SSD, that's a Flash memory storage company.

Q. All right. So but my point is after they owned all of your technology, they went out and bought other companies to get into Flash, right?

A. Yes.

Q. Now, did you become aware, as a member of the technical advisory board, that EMC Ventures had approached Pure Storage to discuss its technology?

A. I don't -- I don't know about that.

Q. Now, you yourself indirectly were an investor in Pure Storage, right?
A. Yes. I'm a small limited partner of Greylock, which invested in Pure Storage.
Q. So Greylock, that's one of these --
A. I'm formal acting CEO and Aneel Bhusri is on the board of Pure Storage.
Q. And you are a partner in a venture capitol firm called Greylock; is that right?
A. Yes.
Q. And Greylock looks at startups for investment?
A. Right.
Q. And they are trying to pick the best startups and the best investments they can?
A. Right.
Q. And that's why you've invested in Greylock, right?
A. Well, that's not -- I don't make decision for Greylock who to invest. I was only investing Greylock because they asked me to.
Q. Okay. But you know that one of the investments Greylock made was in Pure

Storage, right?

A. Yes.

Q. And you've been following and aware of Pure Storage since it was started back in '09 as well?

A. I don't know the details about Pure Storage. I know the existence of Pure Storage.

Q. Okay. Now, I think you testified on direct that you and your colleagues at Data Domain, you didn't invent the idea of deduplication, that was pretty old?

A. Well, what I said was the cause of finding duplicate data start back in the '70's, when we're building compression software. That has been around for decades.

Q. And actually in your patent, in the '464 Patent, you mention that there are other forms of deduplication technology that have been attempted, right?

A. Right, but they didn't solve the challenging problems. And that's what the invention is about.

Q. You mentioned a number of

different technologies in the '464 patent that were performing deduplication and indicated yours was better, right?

A. It's not only better. I think the previous -- the previous approaches wouldn't be able to build a commercial product. I think that our technique is the one that enabled us to build a commercial product.

Q. One of the papers that was out there before your invention was the Venti paper, correct?

A. Yes.

Q. Now, the Venti paper, let's back up a minute. Do you attend a conference each year called the FAST conference, F-A-S-T?

A. Not every year, but I went there several times.

Q. Okay. And FAST stands for file and storage technologies, correct?

A. Yes.

Q. That's an annual conference of file and storage people? You have to give me a verbal answer, Doctor Li.

A. Yes.

Q. Okay. And you've attended it a number of times in the past?

A. Yes.

Q. Now, could you open your binder there to DTX-560, please?

A. Okay.

Q. And can you tell us what you see there? Is that the Venti system paper?

A. Yes.

Q. Okay. You're familiar with that?

A. Yes, we also disclosed this for our patent filing.

Q. Okay.

MR. VAN NEST: I'd like to move DTX-560 in evidence, Your Honor.

MR. KREVITT: No objection, Your Honor.

THE COURT: All right. Admitted without objection.

BY MR. VAN NEST:

Q. Now, Doctor Li, the Venti paper was actually presented at the FAST storage conference inspect late January of 2002, correct?

A. Yes.

Q. As we have on the screen, this is the title of the -- not the paper, but the proceedings, correct?

A. Yes.

Q. And you remember that they occurred in late January of 2002?

A. Yes.

Q. You attended the conference?

A. Yes, I did.

Q. And you remember attending the presentation of the Venti paper, right?

A. Yes. That's why we learned they could not -- their paper is the techniques that couldn't build a commercial product.

Q. Doctor Li --

MR. KREVITT: Your Honor, if the witness can be allowed to finish his answer, please.

THE COURT: I'm going to let him finish his answer. I think he has actually.

THE WITNESS: I was about to elaborate a little further, but --

THE COURT: Well, so we'll save

the elaboration. Go ahead, Mr. Van Nest.

MR. VAN NEST: Thank you.

BY MR. VAN NEST:

Q. My point was you actually attended the presentation in January where this paper was presented?

A. Yes, I said I did.

Q. Right. And then you actually read the paper?

A. Yes, we read the paper to identify the problems that we had not been able to give a product.

Q. Can I have the next page and the title of the paper? The paper concerns data storage techniques, correct, the title is a new approach to archival storage, right?

A. Right.

Q. And that's the problem that you and your inventors were working on at that time?

A. Yes.

Q. Okay. And the very first sentence indicates --

THE COURT: All right. So he's familiar with the paper. That's what you're

going to do with him. Is there some other question you have?

MR. VAN NEST: The only question I had beyond that, Your Honor, was that the paper in the abstract discusses that it's using deduplication in a data storage system.

MR. KREVITT: Your Honor --

THE COURT: Is that what the paper is about?

THE WITNESS: Well, there was no word called deduplication in this abstract.

BY MR. VAN NEST:

Q. But, in fact, there is a discussion of a technique for performing deduplication, right, Doctor Li?

A. I would say this is a research project at Bell Labs at the time we were using, attempt to view such a system, but they couldn't -- this paper described why it wouldn't work, therefore, we identified all the problems, we learned from this paper that what problems to work on.

Q. My question was a little different. Could we highlight that third

sentence in addition, duplicate copies of a block can be coalesced reducing the consumption of storage and simplifying the implementation, that means deduplication to professionals like yourself, Dr. Li, does it not?

MR. KREVITT: Your Honor, objection. It's exactly what we discussed.

THE COURT: All right. I'm going to sustain the objection.

Move on, Mr. Van Nest.

MR. VAN NEST: I will do so, Your Honor.

BY MR. VAN NEST:

Q. Now, Dr. Li, you filed for what became the '015 patent in the patent office on December 20th of 2002; correct? If you want to look --

A. Maybe.

Q. It's DTX 797. And this is also PTX 3, Your Honor, it's already in evidence. I'll put on the screen the cover and let's highlight the December 20 date. So that's the record date in the patent office at which time the patent was filed; right?

A. Yes.

Q. There are some other dates after that, but that's the official patent office date for the filing of the '015 patent; correct?

A. Yes.

Q. And you're not exactly sure what specific date you and your fellow inventors actually came up with all the ideas in the '015; correct?

A. That's not true. I just testified before about the dates.

Q. Is there a specific date that you believe is the date at which --

A. February 13, 2002.

Q. And that's based on the photographs; correct?

A. Based on the name of the file of the photograph.

Q. Now, you testified about an architectural specification; correct? Could I have PTX 8, please. And I just want to get clear on this. This architectural specification itself, this document is dated April 3rd, 2002; correct?

A. Yes.

Q. And so the information in this specification is as of April 3rd of '02; right?

A. Yes.

Q. And you mentioned a version 0.1 that's shown on the face there as having an earlier date; correct?

A. Yes.

Q. Just to confirm, you were unable to locate that document?

A. I could not find that document. It's been so many years ago.

Q. You looked in your files, you couldn't find it?

A. I looked in my files.

Q. You looked in your office, you couldn't find it; right?

A. Which office?

Q. Well, did you look in an office? Was there more than one location that you searched?

A. Well, my office at Princeton doesn't have information of the company. I don't have access to the office.

Q. The information for the company, that went to EMC when they bought Data Domain; right?

A. That's correct.

Q. And as far as you know, EMC hasn't been able to find this March 16 document, either; right?

A. I don't know. They didn't tell me whether.

Q. But they have all the company records and they got them back in '09 when you sold the company; correct?

A. I assume so.

Q. Now, you gave a deposition about a month ago?

A. Right.

Q. Dr. Li, correct, you were under oath for the deposition?

A. Yes.

Q. And you told us that you weren't exactly sure what was in the earlier version of the April 3rd document; correct?

MR. KREVITT: Your Honor, objection. That's not impeachment, quoting a

deposition to the witness.

THE COURT: Overruled.

BY MR. VAN NEST:

Q. Dr. Li --

A. I don't think I said exactly what you said.

Q. Would you open --

THE COURT: Wait, Mr. Van Nest. He was speaking.

MR. VAN NEST: I'm sorry. Go ahead, Dr. Li.

THE WITNESS: I don't think -- I don't remember exactly what I said. That was a seven-hour deposition. I'm not sure what your question was.

Q. Well, Dr. Li, you're not exactly sure what was in the earlier version even now because we don't have it; right?

A. Right. We don't have the current version. I think what I said was that based on the content of the screen shots, based on our version, I think the version of 0.11 has a minor revision from version 0.1, that's what I said.

Q. But you also said you weren't

exactly sure what was in the earlier version because you hadn't seen it; right?

A. Well, I wrote all version because at that time I was the only person who write specification. I think it would be natural for me to document what we had discussed before, even in version 0.1, that's why I'm assuming the difference is not -- is minor.

Q. But you're making that assumption, again, you don't know for sure; right?

A. Well, I have the screen shots to remind me of what's in -- what I would write in 0.1 version.

Q. Could you open your deposition there, Dr. Li, to page 193 at lines 7 through 14. Start at line 7, did you give this answer to our question:

"Question: But just to be clear for the record, you don't know for certain looking at this document what the differences are in this document with respect to version point one; right?

"Answer: I can not tell exactly what was in 0.1. All I can tell, my guess is

not a big difference between the two."

Did you give that answer?

A. Probably. I didn't read this, the record, but probably. That's what I just said a few minutes ago.

Q. Now, you never -- as of a month ago, you had not done any element-by-element comparison of this architectural specification with your patents; correct?

A. With what?

Q. With your patents, with the claims of your patents.

A. No.

Q. And so --

A. I'm aware --

MR. KREVITT: The witness --

THE COURT: Well, he hadn't done it as of a month ago. Okay. Mr. Van Nest, question.

BY MR. VAN NEST:

Q. Now, as of then, you hadn't even read the dependent claims in your patent; correct?

A. Well, I think our tradition is

that when we file a patent, we have a discussion with the patent lawyers. Then we'll come up with a claims before we sign our name as inventor, we need to read all the claims. That's our standard practice.

Q. My question was a little different. As of a month ago, you hadn't even read the dependent claims in the '015 patent; right?

A. This is what I was trying to answer your question, I'm saying I read that before, before I put my name as a coinventor.

Q. But as of a month ago, you hadn't reread the dependent claims --

A. No, the dependent claims I read before that.

THE COURT: Dr. Li, let him finish the question.

Q. You hadn't read the dependent claims; right?

A. Do you mean before a month ago or after a month ago?

Q. Before a month ago.

A. Before the month ago, I'm sure I

read it because I would not have signed my name without reading the claims.

Q. But you had not read it in years when you gave your testimony a month ago; correct?

A. I haven't read -- I haven't read them for a long time. I don't remember how many years. This was filed a long time ago.

Q. All right. And obviously you haven't made any comparison of those claims to the very first version of the architectural spec because it doesn't exist; right?

A. Can you rephrase your question again? I'm sorry.

Q. Yes. You haven't done any comparison between the dependent claims in the '015 patent and the architectural spec, the first version of it, because you can't find the first version; right?

A. You are right, I cannot find the first version.

Q. Now, let's turn to the three whiteboard photos. You said it was your handwriting on all three of the boards?

A. Yes.
Q. So you wrote that yourself?
A. Yes.
Q. And I think you said they were taken with an old camera?
A. Yes. With an old camera.
Q. You don't have the camera anymore?
A. I still have the camera.
Q. You still have the camera?
A. I still have the camera.
Q. Did you testify just a month ago that you didn't have it?
A. No, I have the camera. I think the question probably was about whether I have the storage in the camera, the Flash memory of the camera.
Q. Open up your deposition, please, Dr. Li, to page 119, lines 17 to 24?
A. 119?
Q. Yes. Lines 17 to 24.
A. Okay.
Q. Were you asked this question and did you give this answer:
"Question: Now, do you still have

the camera that you used to take these photos?

"Answer: No, I don't have it. This is a really old camera."

Did you give that answer?

A. Maybe.

Q. Do you have the camera now or not?

A. I think I have the camera. It's probably in one of the boxes I haven't opened. But I think I may have the camera.

Q. Why did you last see it?

A. Several years ago, just very old camera.

Q. But a month ago when we asked you that question under oath, you said I don't have it; right?

A. Yeah, I couldn't find it at the time. But later I think I seen the camera in the box. I haven't opened -- I just moved to a new house, was doing unpacking.

Q. Well, you knew that the issue of when these photos was taken was important, Dr. Li; right?

A. Yes, I do.

Q. And it's important because the

date is very close to the date of one of the other pieces of prior art in this case; right, you know that, too?

A. Well, I think to some degree it's not as important because what -- the early employees all remember very well, when Hugo Patterson came to Data Domain --

MR. VAN NEST: Your Honor, this is not responsive to my question.

THE COURT: All right. Dr. Li, I think you have gone beyond what the question is right now. So I'm going to ask you to stop and Mr. Van Nest ask another question.

THE WITNESS: Okay.

BY MR. VAN NEST:

Q. Now, you don't know whether the date setting in that old camera was correct or not when you took the photos; right?

A. I never really checked whether -- I believe the dates on the camera were correct, but I don't -- I haven't -- even today if you check, you would not be able to tell whether so many years ago the dates were correct. You can't say anything a hundred percent correct for

any computer devices.

Q. You told us a month ago that you didn't know whether the date setting on this old camera was right or not?

A. I could not say a hundred percent say back in 2002 the dates were correct.

Q. All right. Now, let's put up PTX-9. That's the first one. This first photo, Doctor Li, I think we established has a title file date of February 13th, but the metadata shows that it's later, right?

A. Right.

Q. The metadata shows February 27th and the title of the file says February 13th, right?

A. Right.

Q. Now, you're the one that created the title on that file, right?

A. That's correct.

Q. And the title on a file, like any other file, can be changed any time, right?

A. It depends on your file system.

Q. Your file system would allow you to change that file date any time?

A. No. For certain file systems, if you change the name of the file, the date would be changed of the metadata too.

Q. Now, I think you testified earlier that you weren't sure exactly when these photos were taken, right?

A. I was just trying to refer to you I knew it was in February. I gave you evidence you did not want to take.

Q. My question was a little different. Even a month ago you weren't sure exactly when the photos were taken, right?

A. I said -- I think I said I was sure it was in February. And I was going to use evidence to show, but you're not allowed me to use that evidence.

Q. Well, let me ask you this. Didn't you testify just a month ago, with respect to the meeting where the notes were taken that you don't remember exactly?

A. I think I said it was in February.

Q. Well, please turn to your deposition again, Doctor Li, at page 271.

A. 271.

Q. Yep. Lines 10 through 16. And were you asked this question and did you give this answer? All right. Now, when in your recollection did the meeting occur where the notes were recorded on the white board that we see represented in Exhibit C? Answer, I don't remember exactly. Did you give that answer?

A. Yes. When I say not exactly, I don't know exactly when was taken in my memory, but I have out of evidence to show it was taken in February, that looks like the Court wouldn't allow me to use that evidence; is that correct?

Q. Excuse me, Doctor Li. Haven't you also testified that you thought that the photos were all taken at or about the same time within a day or two of each other?

A. I didn't say one or two days. I think we always taken after, but before we need to erase the board. Also when I bring the camera in.

Q. My question was, didn't you previously testify that you thought, you guessed that the three photos were taken within a day or two of each other?

A. I can't remember things like that so many years ago.

Q. But at least as of a month ago you thought, you guessed the photos were taken within a day or two of each other, all three of them?

A. I can't remember whether a day or two. But even I said so in the deposition, I could be wrong, because any human memory deteriorates over time. I can't remember 2002 exactly what happened.

Q. Okay.

A. But I have evidence to show it was taken in February sometime.

Q. Now, as a matter of fact, the metadata on two of the three photos show they were taken later in March, right?

A. Yes.

Q. So if it's true that the photos were taken within a day or two of each other, it's possible, isn't it, Doctor Li, that they were all taken in March?

A. Well, I don't remember whether how many days were on the board before we took the

photo. That's just so many years ago. I can't make such assumption.

Q. But it's clear that as to two of the photos, the metadata has a date later in March, right?

A. Yes, March 20th.

Q. Now, you also, as of a month ago, had not compared the claims of the '015 Patent with anything on the white board, right?

A. As I said before, when we file patents, we always review all the claims.

Q. Excuse me, Doctor Li, that's not an answer to my question. My question was, as of a month ago when we talked to you under oath, you had not compared any claim of the '015 Patent with the elements displayed on the white board, right?

A. No, I have not.

Q. All right. And that's true for all three of the photos, correct?

A. Well, I think how do I describe this? When we file a patent, we --

Q. Again, doctor, excuse me. I'm asking you whether the statement you just made

is true for all three photos.

A. I was just trying to answer how we review -- we review claims when we file for a patent.

Q. You'll get a chance to do that with your lawyer. Don't worry, you'll get a chance to do that. My question is simply, as of a month ago you hadn't analyzed whether all of the elements of your claims appeared on the white board, right?

A. I did not compare, take out the white boards and compare it with the claims if that's what you meant.

Q. That's what I meant. And I think you testified that even with respect to the white boards, you hadn't even read the dependent claims to see what element they had, right?

A. As I said before, we always read the claims before we put our name as a co-inventor.

Q. Well, what you told us a month ago, Doctor Li, was that with respect to dependent claim 7 of the '015, you hadn't done a comparison to determine whether that was

conceived before March 16th, right?

A. Well, I did not do a comparison between the claims and the specification, if that's what you meant.

Q. And with respect to the dependent claims, you hadn't even read those, right?

A. When -- what time frame do you --

Q. Prior to your deposition a month ago.

A. Well, as I said, we always read the claims before we sign our name. And that's what I did, but close to the deposition, I did not read before I went to the deposition. Again. I did not read again.

Q. You told us that Data Domain was a successful company, Doctor Li. I'm switching topics.

A. I think -- I would think it's successful, yes.

Q. And you're very proud of the work you did there. I take it at Data Domain, you obtained many patents, multiple patents for your work?

A. Yes.

Q. And all those patents were important in contributing to the success of the products?

A. Yes.

Q. Okay. And you mentioned compression, that's one of the other technologies that you used at Data Domain?

A. Yes.

Q. That was important too?

A. Yeah. I think in the company we also -- we today call it deduplication. We called it global compression, so compression is meaning both local and --

Q. But there were a whole series of technologies that were important to the success of Data Domain, right?

A. There are many technologies, yes, but Data Domain is all about building deduplication storage system.

Q. But there are many technologies that go into the Data Domain products; right?

A. But they are the key technology, the key technology --

Q. There are many others that do --

MR. KREVITT: Your Honor.
THE COURT: Dr. Li, can you maybe say a little louder, finish answering the question that you were just answering.
THE WITNESS: Yes. What I was saying is the key technology of Data Domain is deduplication storage system. Technology is the deduplication storage system.
BY MR. VAN NEST:
Q. There were many other technologies that contributed to the success of your products; right?
A. Yes, there are many technologies.
Q. And there are many other factors that make success happen, too, like the people?
A. Yes, because people invent technologies.
Q. And people sell products, too; right?
A. People sell the products.
Q. People market the products?
A. Yes.
Q. And the deduplication name I think you mentioned came from a marketing slogan that

someone else had come up with; right?

A. For market research firm.

Q. A market research firm told you that would be good to use and you used it, and that was part of the success, too; right?

A. I don't think so. I think the market research firm actually didn't tell us, they don't -- because Data Domain didn't have much money, they didn't really work with research firms.

Q. My point was simply that marketing and sales, they're also important to the success; right?

A. I'm sure you need many factors to success.

MR. VAN NEST: Thank you, Dr. Li.

THE COURT: All right. Redirect.

MR. KREVITT: Very quickly.

REDIRECT EXAMINATION

BY MR. KREVITT:

Q. Real quick, Dr. Li. Mr. Van Nest asked you questions about whiteboard photos and changing time stamps on cameras. Just to be clear, did anything Mr. Van Nest asked you, have

you seen anything that changes or in any way makes you question the testimony that you gave earlier that you are actually certain that by March 16, 2002 you had conceived of all the ideas in the '015 and '464 patents?

A. Yes, in February, yes.

Q. You had conceived of them in February?

A. Yes.

Q. And you're absolutely certain of that?

A. Yes.

Q. And I know we covered your background, you have been a professor at Princeton for thirty years. Is honesty and integrity important to you, sir?

A. Yes. As a human being, as a researcher in academics, we have to have integrity.

Q. And before today, in your thirty-year career as an acclaimed scientist and professor at Princeton University, has anyone ever challenged your integrity or your honesty?

A. Not really. I think -- but I have

examples to show that I will maintain my integrity independent of financial gains.

Q. You have examples of your integrity, not that anyone has ever challenged you?

A. That's right.

Q. I just want to be clear. Is there any one you want to share with us, Dr. Li?

A. Well, early days at Data Domain, we were looking for someone to join the funding team who has a CEO track record, and one person introduced by the venture capital firm, and this person actually came up with the name Data Domain. And we were experimentally working together for two weeks.

And during that time, towards the end, this person came to me, said Kai, you know in this company right now, the most important people are you and me. So this person was trying to discuss with me about how to reposition the founder shares, reducing the founder shares for my two other cofounders and increase mine and obviously this person would get more. And then already agreed with my

cofounders not to continue, and we didn't hesitate a second, I disengaged with this person.

This person asked me, "Did you fire me?" I said "Yes."

I think that I would rather maintain my integrity given in the case I may have financial gain.

Q. Thank you, sir. I appreciate your time.

MR. KREVITT: No further questions, Your Honor.

THE COURT: All right. Dr. Li, you may step down.

THE WITNESS: Thank you.

MR. KREVITT: Would you like us to call our next witness, Your Honor?

THE COURT: I would.

MR. KREVITT: Your Honor, EMC at this time has the pleasure of calling Mr. Ian Jestice, a technical expert for the deduplication patents. My colleague, Stuart Rosenberg will be speaking with Mr. Jestice.

THE CLERK: Please state and spell

your full name for the record.

THE WITNESS: My name is Ian Jestice. I-A-N, J-E-S-T-I-C-E.

IAN JESTICE,

the deponent herein, having first been duly sworn on oath, was examined and testified as follows:

MR. ROSENBERG: Your Honor, may I approach the witness with a witness binder?

THE COURT: Yes, you may.

MR. ROSENBERG: May I approach the Court with copies?

THE COURT: Yes.

DIRECT EXAMINATION.

BY MR. ROSENBERG:

Q. Good morning, Mr. Jestice.

A. Good morning.

Q. Can you please explain to the jury very briefly why you're here today?

A. Yes. I am Ian Jestice and I have been asked to come here today to talk about two patents, and whether or not Pure Storage infringes those patents.

Q. And so let's get something clear right off the bat. There are two deduplication patents at issue in this case; right?

A. That's correct.

Q. The '015 patent and the '464 patent?

A. Yes, that's correct.

Q. And on one of those two patents, you understand that the parties already agree that Pure Storage infringes the patent?

A. Yes, I understand that.

Q. Which patent is that?

A. That's the '015.

Q. So you are not going to in light of that agreement go through infringement of that patent today; is that right?

A. That's correct.

Q. And then the other patent is the '464 patent?

A. Yes.

Q. And you are going to express an opinion today about infringement of the '464 patent; right?

A. Yes, that's one I'm going to talk

about today.

Q. Is there a dispute about infringement of the '464 patent?

A. There is a dispute about one element or one claim on the '464 patent.

Q. Do you have an opinion about whether the asserted claim of the '464 patent including that one element is, in fact, infringed by Pure Storage?

A. Yes. It's my opinion that that -- all of the elements of the claim 32 are infringed by the Pure Storage products.

Q. So let's back up a little bit. On the slide here we have just a list of topics I'm hoping to cover with you today. Will you tell us a little bit today about what deduplication technology is?

A. Yes. Deduplication technology as you already heard several times is to do with identifying data in a computer system that is going to be stored and to remove duplicates to save space.

Q. And just to review the remaining topics, are you going to tell us a little bit

about patents at issue, your opinion about infringement of the '464 patent and then some technical issues that relate to damages in the case?

A. That's correct.

Q. So Mr. Jestice, I'd like to ask you about your background. Can you tell me a little bit about your educational background?

A. Yes, I'm -- if you haven't recognized my accent, I'm from the United Kingdom and I attended the City and Guilds Institute of London in 1968 to 1971.

Q. What did you study there?

A. I studied computer science and telecommunication.

Q. And did you get some kind of certification from the City and Guilds Institute?

A. Yes, I got a core technological certificate from the City and Guilds Institute.

Q. Do you have an understanding of how that compares to a Bachelor of Science degree in the United States?

A. When I moved to the United States,

almost 40 years ago, the Department of Immigration and the Department of Labor looked at my qualifications and concluded it was approximately the same as a bachelors degree.

Q. And while you were in school in London, did you also have any work experience?

A. Yes, I was employed by the British government. They owned the telephone company, the Post Office, and I worked for them while I was studying.

Q. Did you receive any kind of recognition or reward for your work for the British government while you were there?

A. Yes. The Post Office had an idea recognition plan. I developed a system for recognizing the failure of multiple voice and data circuits when they failed digitally.

Q. Mr. Jestice, what did you do for a living after you worked for British government?

A. I joined IBM.

Q. And how long were you at IBM?

A. I was at IBM a total of 10 years in England, Canada and the United States.

Q. What kind of work did you do at

IBM?

A. I did many things and I did -- I was a system engineer supporting customers and I was a storage specialist.

Q. Did you work on any storage systems as a storage specialist at IBM?

A. Yes, I worked on many generations of storage systems that IBM was selling at that time.

Q. And I believe we have an example of one of them up on the screen. Can you tell us what this is?

A. This is one of my favorite systems. This is the 3340 Winchester disk drive.

Q. What is the 3340 Winchester disk drive?

A. You can't see the size of this, but it stood approximately up to half way through my chest. It was a big, physically big device. And it held 30 megabytes and 60 megabytes in two 30-megabyte drives.

Q. How does that relate to the name Winchester?

A. Winchester, it got the name of Winchester because this affectionately was known as the 30/30. It held 30 megabytes and 30 megabytes. And I believe there's a Winchester rifle that's called the 30/30..

Q. And how does this disk drive relate to the disk drives that we've seen earlier in the case and passed around to the jury that you might find in a modern day computer?

A. Well, the Winchester disk drive was the first disk drive that incorporated all the mechanical and all the electronics in one package and the rotating drives that the Pure Storage is passing now is a Winchester disc drive. And this it's grandfather or great grandfather.

Q. So apart from your work on particular storage systems at IBM, did you do anything else?

A. My job supporting customers in the field, so I would support the software, hardware. I did capacity planning for large enterprise customers.

Q. What do you mean by capacity planning?

A. So the systems I supported were multimillion dollar systems and part of my job at the customer was to help them look at their future needs to predict how much, in this case storage they would need.

Q. And apart from your work at IBM, do you have any other work experience that relates to storage systems?

A. Yes, after I left IBM, I went to a company all Amdel, company that's now called Fujitsu, partially owned by Fujitsu and as part of my time there, I worked in the storage product department developing storage systems.

Q. And do storage systems that you worked on at Amdel include any of the kinds of storage systems the jury is going to hear about and has heard about already in this case?

A. Yes, these are large storage systems for event price customers.

Q. Did you do any teaching while you were employed at Amdel?

A. Yes. Amdel had a very active

college recruiting program. That meant that we as engineers, managers, would go out to university, hiring engineers to help us with product development. And the engineers that arrived obviously didn't know Amdel technology and didn't know the actual hands on experience, developing stuff for customers. And so I took classes on our computer architecture error recording and error reporting.

Q. Mr. Jestice, in addition to the experience you had working directly on storage systems and teaching relating to storage systems, have you ever founded a company?

A. Yes. I founded a company called Zadian Technologies.

Q. How do you spell that?

A. Z-A-D-I-A-N. And the I-A-N is Ian. That's how we got the name.

Q. And what kind of work did you do when you founded Zadian?

A. The company we founded produced test equipment for storage systems. And I was the director of design assurance and part of that job was to make certain that the product we

were developing was the one that obviously we could sell. We wanted to sell the system. And secondary job I did there was as the IT manager. I managed the IT, all the computers for the corporation.

Q. How long did you work at Zadian?

A. I worked there until we sold the company to a company called Xyratex.

Q. What is Xyratex?

A. Xyratex is a contract manufacturer that makes computer systems, storage systems for other companies.

Q. Mr. Jestice, how many years of experience in total do you have working on technologies that relate to storage systems?

A. I've been working on storage systems since I worked for the Post Office, almost 40 years.

MR. ROSENBERG: So Your Honor, we'd ask the Court to accept Mr. Jestice as an expert in the field of storage systems.

MR. VAN NEST: No objection, Your Honor.

THE COURT: All right. You may

proceed.

BY MR. ROSENBERG:

Q. Mr. Jestice, now that we've talked about your background, I'm hoping you can help gives us some background on the technology at issue in this case. What is the technology that you're here to talk about that's at issue in this case?

A. The technology is about storage systems, large enterprise storage systems. And in particular one called deduplication.

Q. What is a storage system?

A. Companies that want to store -- okay. A storage system stores computer data. And this storage system that we're talking about, this arena is to do with very large amounts of data stored by large companies.

Q. And I have a slide here. Can I ask you to explain, starting with what's at left side. I think it's a little cut off on the screen there with the word hosts, what's going on in this illustration of data storage technology?

A. Yes, in the left side are the host

computers which would typically be workstation is or PC's and then between them is a data stream and the data stream goes over on interface which could be fiber optic, it could be copper on the storage system itself. And on the right side is a storage system consisting of a controller and some storage element.

Q. So let's just take those one at a time. The host are things like people individual computers; is that right?

A. These are people looking at their email, writing email, looking at databases, just the sort of things that computers are so much involved with in our society today.

Q. And the data stream is the data that's moving from the host into a storage system?

A. Yeah. This is data typically split up into blocks or segments.

Q. And how much data are we talking about streaming or flowing into a storage system?

A. It depends on that interphase, but it's huge amounts of data. We're talking about

sending a movie in a second or less over these streams.

Q. And then inside the data storage system on the right side of the graphic here, there are two parts, the controller and the storage elements. What is a controller in a data storage system?

A. The controller in many systems certainly today is a little computer itself, running software. And it is like a librarian in a book library. When it receives the streams of data, it decides what to do with it, where to put it and how to handle it.

Q. What are the storage elements inside a data storage system?

A. Storage are the devices that actually store the data.

Q. What are those storage elements made up of, what's the media in there?

A. Historically they have been -- they could have been tape drives, rotating disk drives that you have seen or the solid state Flash memories.

Q. So we have shown some examples of

each of those three here. If a company is making a storage system, how do they choose which one of these three to use as the storage elements?

A. Well, like most things in computers there is a trade off between the price and the performance. So the tape drives are typically very cheap and relatively slow. The hard disk drive is much faster but much more expensive than tape. And then the Flash drive is even faster, but it's more expensive than hard disk drives.

Q. Is there technology that can make the more expensive kinds of media, the hard disk drives or the Flash memory, more affordable for use as a storage element in a storage system?

A. One way is to actually save less data.

Q. And is deduplication a way to do that?

A. Deduplication is one of those technologies.

Q. Tell us briefly what is deduplication?

A. Deduplication is identifying duplicate data and removing, just keeping a single copy.

Q. Can you give us an example of that in the real world?

A. So if you were working at a company that let's say a thousand people and the president sent out a thousand emails, the same thousand emails to every employee, without deduplication, every one of those employees would save a copy of their emails. So with deduplication the system would identify those and only save one copy of the email, saving a significant amount of space on the storage systems.

Q. Mr. Jestice, does all deduplication work in the same way?

A. No. There is two kinds that I am going to talk about today, background deduplication and inline deduplication.

Q. Turning the first one you mentioned which is background deduplication, can you explain to us how background deduplication works?

A. Yes, I can. So I have a -- something to show how this works. On the left-hand side is the hosts as I described before and there is a data stream coming across the interphase to the storage system itself. In background deduplication, a segment will come into the storage controller, we have the animation.

Q. Which segment in particular are we highlighting here?

A. The first segment which is marked P2, P2 is a representation of the data.

Q. Some of the segments have already been stored; right?

A. Some of the segments will already be stored.

Q. For example, maybe A9?

A. Yes.

Q. And how does background deduplication work on segments that have already been stored?

A. So in background deduplication, there is a processor running in the storage controller that is going around looking for

duplicate sectors. So as A9 in this case was stored in two different places, I would say erroneously, but as part of background deduplication it would pick up that duplication and delete one of the copies.

Q. And there is animation of deleting the copy there. What does the word background have to do with this?

A. Background typically describes a process in a computer that's running in its spare time, if you like, it's when the computer is not handling its major task, so this would just use up resources going around trying to find these duplicates.

Q. And so this is a process operating on data that's already been stored in a storage system?

A. Yes. In this case, both copies of the data were stored in the storage system first.

Q. You mentioned a different kind of deduplication, I believe you called it inline deduplication. Can you explain how that works and how it's different from background

deduplication?
A. Yes. Inline deduplication looks for the data before it's stored and, therefore, saving the extra store.
Q. So what happens, for example, if data comes in that has not yet been stored?
A. So data comes into the storage controller, in this case we have a block that's got C4, and the storage controller looks to see if there is a duplicate already. And in this example there wasn't. So it stores C4 the first time.
Q. So in inline deduplication, you're looking for a duplicate of a segment that you have not yet stored; is that correct?
A. That's correct.
Q. And if you don't find a duplicate, then you'll store the segment?
A. Then you store the segment.
Q. And in this example we showed the data inside that segment, the C4?
A. Yes.
Q. And what happens if a data segment comes in that is a duplicate?

A. If there is a duplicate, in this case we're using P2 as an example, the storage controller during the storage process finds P2 and, therefore, doesn't need to write it a second time.

Q. And so what happens to the copy of P2 that's just arrived but hasn't yet been stored?

A. That is just discarded.

Q. Mr. Jestice, as between the two kinds of deduplication you just showed us, background, operating on data that's already been stored, and inline where you're operating on data you haven't yet stored, does inline deduplication have any advantages over background deduplication?

A. In this technology, it has. We're talking about Flash memories, solid state memory, it has two distinct advantages.

Q. What are they?

A. The first is you don't have to write the data twice, so that saves you having to buy extra storage to hold that data until the background process came in and cleared it out.

So that's one significant advantage.

The other advantage is the Flash technology itself is not like rotating disks and magnetic disks, it wears out, and it's a bit like a paperclip. If you take a paperclip and bend it twenty times or so, it will snap. Flash storage fails after a number of writes. So if we don't write the data, then we don't wear out the drives so quickly, which saves money again.

Q. And Mr. Jestice, are there any difficulties associated with performing inline deduplication as opposed to background became?

A. Yes, there is a problem called latency or delay. That background, that inline deduplication takes a finite amount of time. And so we have to be able to handle that fast enough to not delay the saving of data from the other users or even the user that's trying to save the data.

Q. And am I correct just to summarize that then inline deduplication has advantages over background deduplication with respect to how much memory you have to have and whether you wear it out, but there are difficulties in

implementing inline deduplication?

A. Yes. There have been difficulties trying to reduce that latency.

Q. And Mr. Jestice, how does the technology that you just described relate to the patents that are at issue in this case?

A. Well, the patents that are at issue in this case, in this case, are describing a better way, a more efficient way to do inline deduplication.

Q. Mr. Jestice, is this one of the two patents you reviewed in this case?

A. Yes, this is the '015 patent.

Q. What's the title of this patent?

A. Efficient data storage system.

Q. Is this the other patent you reviewed in the case?

A. Yes, this is the '464 patent.

Q. And what's the title of this patent?

A. It's the same title, it's efficient data storage system.

Q. Were you here earlier today when Kai Li testified about his work at Data Domain?

A. Yes, I was.

Q. Do you see Data Domain listed on the patent?

A. Yes, Data Domain is listed on the lower left-hand corner as the assignee.

Q. And do you understand how Data Domain relates to the parties in this case?

A. My understanding is that Data Domain was taken into the EMC fold.

Q. And is a part of EMC?

A. It is part of EMC now, yes.

Q. Mr. Jestice, had you heard of Data Domain before you got involved in this patent case?

A. Yes, I had. Anyone that was working in that enterprise storage business would have heard of Data Domain.

Q. Turning back to the patents, can you tell us very briefly at a high level, what is the invention in the deduplication patents?

A. Well, it says it in the title, it's an efficient data storage system. It is deduplication and in particular this is inline deduplication.

Q. Mr. Jestice, is there a part of the specification in the patent that discusses the problems associated with duplicate data?
A. Yes. The specification or description of a patent, they describe what the problems were. For example, several copies of the same data, we have highlighted here.
Q. And before Dr. Li and his colleagues tried to solve this problem, had anyone else tried to solve the problem of duplicate data in the storage system?
A. Yes, there were other people working on the problem.
Q. Does the specification acknowledge that?
A. The specification talks about the problems that were.
Q. What does the specification say very briefly?
A. It says there have been many attempts to prevent redundant coping of data.
Q. What does the specification say about whether those attempts from been successful?

A. It says these approaches incur significantly latency. It would have been desirable to reduce the latency, so it's addressing the problem of latency, the time it takes to write the data.

Q. Can you explain one more time what is latency, and maybe give us an example of how that would affect somebody in the real world?

A. It's the delay writing data. If you were working in an organization with such a system and you were saving a document, saving an email, if there was significant latency, you would see a little clock going around and around and around while you were waiting. This idea reduces that latency, which means you would get a faster turnaround when you save data.

Q. Mr. Jestice, how did Dr. Li and his colleagues solve that problem in the deduplication patents?

A. They came up with an idea for doing preliminary checks that efficiently would determine whether the data had been deduplicated already.

Q. What do you mean by preliminary

checks, why preliminary?
A. A preliminary check is done early, it's done inline, and it's not a hundred percent certain whether it is a duplicate or not, but it can be done quickly.
Q. And why would a preliminary check be better than just doing a certain check against all of the data you already have stored?
A. A preliminary check can be done very quickly and the full check takes a lot longer.
Q. Mr. Jestice, now that we have looked at the specification in the patents, I would like to turn to the '464 patent claim that's at issue in this case. Is it your understanding that there is a dispute about whether Pure Storage infringes this claim?
A. The dispute is only about the last elements of this claim.
Q. And is it your understanding that the parties agree that the Pure Storage products meet the earlier elements of the claim?
A. Yes. My understanding is the parties agree that Pure Storage infringes the

first two elements of this claim.

Q. Okay. I would like to get to the disputed element in a minute, but just start with a little bit of background about what this claim says. It starts with the language, a computer program product for storing the data embodied in a computer readable medium and comprising computer instructions. Can you explain what that means in plainer English?

A. This means a computer program, software that's designed for very specific purpose, storing data. The computer program is on a -- some device that's readable by a computer such as a disk, CD, Flash drive. And it consist of instructions, computer instruction, software.

Q. And do the Pure Storage products that are accused of infringement in this case include a computer program product that includes instructions for the steps listed here?

A. Yes, they do. They call it Purity software.

Q. What is Purity software?

A. It is the software that's a bit

like the Windows software, for example, if you're running on a PC, except this software is designed for a storage system.

Q. So it's the operating system for the Pure Storage products?

A. Yes, it is.

Q. And how do you know that the Pure Storage products have this Purity software on it that performs these steps?

A. I have looked at the software, the source code of the software.

Q. What is source code?

A. Source code of the instructions that an engineer would write to create the software.

Q. And apart from the source code, did you look at any other materials that informed you about what the Purity software on Pure Storage products is and how it works?

A. Yes, I have listened to depositions. I have looked at manuals -- depositions of Pure Storage employees. I have looked at manuals produced by Pure Storage.

Q. And Mr. Jestice, can I ask you to

turn in your binder to Exhibit 12, which is the FlashArray users guide. And my question for you, is that one of the documents you reviewed in reaching your opinions about infringement?

A. This is one of the user guides, yes, it is.

MR. ROSENBERG: Your Honor, we move Exhibit 12 into evidence.

MR. VAN NEST: No objection, Your Honor.

THE COURT: Admitted without objection.

BY MR. ROSENBERG:

Q. And Mr. Jestice, does the FlashArray users guide discuss the Purity software that you were referring to earlier?

A. Yes, it does. It tells the customer how to use the whole system including the Purity software.

Q. I would like to turn back to the patent claim language and ask you about the steps that the software must perform according to this claim. We're going to put a checkmark next to the beginning there to indicate that the

Pure Storage include this computer program product. So I would like to start here. Can you read for us what that claim language is?

A. This says receiving a data stream comprising a plurality of data segments wherein each data segment is associated with an identifier.

Q. In your understanding, has the Court provided a definition or a claim construction for any of the language in this part of the patent claim?

A. Yes, the Court has.

Q. Let's take a look.

THE COURT: Before we do that, Mr. Rosenberg, so members of the jury, one of the responsibilities I have as a judge is sometimes in a patent claim I have to give what's called a construction to a term that appears in it. And I do that before we have the trial and then what happens is that construction that I give it is what the parties have to use as the meaning of that term.

So when I construed a term, it's a legal analysis, that's the reason why the judge

does it rather than the jury. But then you have to take when you're evaluating infringement or invalidity down the road, you have to accept the construction that I have given. And I believe that the constructions are -- they're written down in an order, but the Purity does not have that; right?

MR. KREVITT: I believe they certainly will. I'm not certain it was included in the materials yet, Your Honor.

THE COURT: In any event, there will be -- before the case is over there will be at least an order of about three pages that you will have that has exactly every construction that I have given in this case. There is maybe about I would say ten terms or so that I have construed. And when the lawyers say -- I'm not going to say this every time when this comes up. When the lawyers say there is a construction that the Court has given, that's what they're talking about.

Go ahead, Mr. Rosenberg.

MR. ROSENBERG: Thank you, Your Honor.

BY MR. ROSENBERG:

Q. Mr. Jestice, has the Court provided a construction or a meaning for any of the language here in this sentence?

A. Yes, it has.

Q. Can we take a look and can you tell me what that is?

A. The Court has defined identifier meaning information that identifies a data segment.

Q. Did you apply this construction in reaching your opinion about whether the Purity software in Pure Storage's products meets this limitation of the patent claim?

A. Yes, I did.

Q. And in general, so I don't want to ask this every time, did you apply the Court's constructions of the language in the claim when reaching your opinion about infringement?

A. All the way through, yes.

Q. Mr. Jestice, is it your opinion that Pure Storage's products and the software on them meet this limitation of claim 32 of the '464 patent?

A. Yes, it is.

Q. Do you understand Pure Storage to disagree with you about that?

A. Pure Storage agrees with me on that.

Q. I think we'll put a checkmark there to indicate that that's agreed. And we'll move on to the determining step. Can you read this claim step for the jury?

A. It's determining using a subset of identifiers that are stored in low latency memory when a data segments has been previously stored.

Q. Has the Court provided a construction for any of the language in this term?

A. Yes, they have.

Q. Okay. So I'd ask you to explain what those are?

A. So, first defining, the Court has defined -- determining. The Court has defined that to mean deciding either conclusively or inconclusively.

Q. And is there any other language in

the claim that's been construed?

A. Yes, there is.

Q. Can you explain?

A. Low latency memory has been described as a memory or cache that can generally be read more quickly or has better throughput than the large memory that stores the entire segment data base.

Q. And so we see that word latency again. Can you remind us what latency is and how it would relate to memory?

A. This is the delay, the time it takes to do something.

Q. And so the Court has explained that the low latency memory is memory that can be read more quickly than other memory; is that right?

A. That's what they define it as, yes.

Q. And I believe there's one more correction here by the Court to this claim; is that right?

A. Yes, the claim says data segments and the court has corrected that to data

segment.

Q. Mr. Jestice, is it your opinion that Storage's products and specifically the software on those products meets this limitation of Claim 32?

A. Yes, it does.

Q. And does Pure Storage disagree with you about that?

A. Pure Storage agrees with me on this.

Q. So I'm adding a check mark there to indicate that. And now we've come to the last limitation of Claim 32. Can you read for the jury what this limitation is?

A. Yes, this is returning the identifier for the data segment in the event that the data segment is determined to have been stored previously.

Q. And has the Court provided a construction for language in this limitation?

A. Yes, they have.

Q. Can you explain?

A. They have defined returning to mean delivering back.

Q. And Mr. Jestice, is this the element of the claim where Pure Storage disagrees with you about whether there's infringement?

A. Yes, it is.

Q. Okay. In your opinion, does the Purity software on every one of the FlashArray products that Pure Storage sells meet this limitation of Claim 32?

A. Yes, it's my opinion that Pure Storage products do infringe this element of the Claim 32.

Q. And how many ways does Pure Storage perform this element?

A. They actually perform it two ways.

Q. And so I'd like to ask you to explain your opinion about that and we have an animation to help, so we're going to turn to that. Backing up, can we talk a little bit about how Pure Storage's deduplication process works? Do you understand whether Pure Storage uses a form of inline deduplication?

A. Yes, they do.

Q. Okay. And what happens in Pure

Storage's inline deduplication process?

A. So this is a very similar diagram to the one I used before and there's an data stream coming in from the left and the storage element on the right and the storage control in the center.

Q. Okay. And what is P2 in this diagram?

A. P2 is a segment that came in, a block of data, and just for this discussion we're saying it contains the data P2.

Q. So P2 would be the actual information in the incoming data?

A. Yes, it would be.

Q. Like the content of part of a document?

A. Yes, it would be.

Q. And what is the next thing that happens in Pure Storage's inline deduplication process?

A. The next that happens is the storage controller assigns an identifier. I'm using this rotating cog to show that this is a software program that's running.

Q. So is this the Purity software that's being represented by the rotating gear?

A. This is the Purity software that's assigned that identifier and it, just for, as an example, it's like a name tag that you'd stick on.

Q. Okay, so the content of the data that we're talking about here is P2?

A. Yes, the content is P2 and the identifier is the name tag Ed.

Q. And why does the software assign an identifier to the incoming data segment?

A. So it can go do a preliminary check to see whether there's a duplicate.

Q. And is there any disagreement, to your understanding, between the parties about whether the Purity software assigns this identifier to an incoming data segment?

A. No, I believe that Pure Storage agrees with that it assigns an identifier. There's no disagreement on that.

Q. So after the Purity software has assigned an identifier to than incoming data segment, here P2, what's the next that happens

in Pure Storage's inline deduplication process?

A. The Purity software goes to a structure called the SD table.

Q. What is the SD table?

A. It's the successfully deduplicated table. It's a list of segments that were previously deduplicated.

Q. And does the SD table contain the identifiers or in this case mention the nametags of segments that have already been determined to be duplicates?

A. Yes, the identifiers, the name tags are what's in the SD table and some way of joining it up with the data, but yes, it contains the identifiers.

Q. And what is the usefulness of a table that contains information about segments you've already determined to be duplicates if what you're trying to do now is determine that an incoming segment is or isn't a duplicate?

A. Well, if you think back to those a thousand e-mails I was talking about, if you receive -- if the storage system receives one duplicate, it's likely there will be more, so if

you keep track of the recently successfully deduplicated ones, you may save some time.

Q. So how does the Purity software use this SD table in the inline deduplication process?

A. The Purity software takes the identifier and compares it with the contents of the SD table.

Q. And what happens if the Purity software determines that there is no match in the SD table for the identifier of the incoming data segment?

A. Yeah, so the animation showed the Purity software searching in the SD table, not finding it, and then it will make a decision to go to another table, called the recent table.

Q. What is the recent table?

A. The recent table is another list of segment identifiers that the Purity software has seen before.

Q. And how does the Purity software use the recent table?

A. The Purity software searches through the recent table looking to see if there

was a match of the identifier.

Q. And what happens if the Purity software, after comparing the indentifier in the incoming segment to the identifiers in the recent table finds a match, what happens if the identifier of the incoming segment is matched to an identifier in the recent table?

A. So the Purity software now goes and checks that the incoming segment data matches the saved data to be absolutely certain it's the same.

Q. So on the left-hand side of the screen you were comparing the name tags and now over here on the right-hand side we're comparing the actual data?

A. Yes.

Q. And have you reviewed the source code that Pure Storage uses to perform this comparison to determine whether an incoming segment is potentially a duplicate of an already stored segment?

A. Yes, I have. The software is long and complex, but typically software designers split the logic of the programming into little

pieces, functions or subroutines and there's a subroutine called compare dup which is software that actually compares data.

Q. That's the software that would perform the comparison in the top right?

A. Correct.

Q. Okay. Is there also software that performs the lookups that takes the identifier of the incoming segment to the SD table and the recent table and performs those lookups?

A. Yes, that's another function called hash lookup.

Q. You said hash lookup?

A. Correct.

Q. What does the name hash have to do with anything here?

A. The hash in computer science terms is an identifier that can be created in many different ways, but it's generally called a hash.

Q. And so here the name hash refers to the identifier or the name tag in our example?

A. Yes.

Q. And the name of the function is hash lookup?

A. Correct.

Q. Okay. And what happens -- let me back up and first ask this. Is there any dispute as far as you understand between yourself and Pure Storage and Pure Storage's expert about whether the software is performing these lookups in the order that you have described here?

A. No. I think both experts agree this is actually how it works.

Q. Okay. What happens next in the Pure Storage inline deduplication process if the software determines that the incoming data segment is a duplicate of a segment that's already been stored, if P2 matches P2?

A. Then the Purity software takes the identifier and stores it in the SD table, successfully deduplicated table, because the Purity software has just decided that it -- it has successfully deduplicated this segment.

Q. And is there a disagreement between yourself and Pure Storage's expert

witness about whether the Pure Storage software is putting the identifier in the SD table at this point in the process?

A. My understanding is that he agrees.

Q. Now, I'd like to turn back, if I can, to the claim language here. I'm sorry, there's one more step, isn't there? Can you explain what that was?

A. Yes, once we've decided it's duplicate, we can discard the P2 that came in from the data stream.

Q. Okay. And now I'd like to turn back to the claim language that's at issue here. Which part of what you just showed us in the inline deduplication process in Pure Storage's products is the part that you think is delivering back the identifier for the data segment in the event that the data segment is determined to have been stored previously?

A. This is when the Purity software delivers the identifier back into the SD table.

Q. So that's step three in the little yellow arrows there?

A. Step three, it's going back to the SD table to put the identifier in.

Q. And do you understand whether Pure Storage's expert agrees with you that this step meets this limitation of the claim?

A. No, he disagrees with me.

Q. And why do you think he disagrees with you?

A. He says that in order for it to deliver back, then the identifier has to have been there before.

Q. The identifier has to have been stored in the SD table in Pure Storage's expert's view?

A. In his view, yes, it has to have been stored in the SD table before it can be returned back there.

Q. And do you think he's right about that?

A. Well, it doesn't make any sense. And so no, I don't think it needed to be stored there before.

Q. And so turning back to the claim language for a moment, can you explain one more

time how you think this claim language delivering back the identifier in the event that the segment's determined to have been stored previously is met by Pure Storage's system?

A. Well, this is just one of the ways that that claim element is met, but it is in the storing -- it's in the storing of the identifier in the SD table by the Purity software that's already been to the SD table.

Q. Okay. And you mentioned this is one of the ways. I'd like to ask you in a couple minutes about the other ways. But first, were you here for Pure Storage's opening presentation?

A. Yes, I was.

Q. And did you see Pure Storage's counsel present an animation of the process of checking the SD table and the recent table?

A. Yes, I did.

Q. Okay. And is this the animation that you saw presented?

A. Yes.

Q. Mr. Jestice, do you think that this animation accurately characterizes what is

happening in the Purity software that's at issue in this case?

A. I don't think it accurately describes it. And it's also only one of the ways that the software infringes.

Q. And so did you have an opportunity after viewing this yesterday to direct the preparation of a demonstrative with edits to this one to show how you think the software really works?

A. Yes, I did.

Q. Okay. And is this the demonstrative you directed the preparation of?

A. Yes.

Q. And what's going on here?

A. So the data is coming into the controller, the identifier is first being checked against the contents of the SD table, then it's being checked against the contents of the recent table. And in the event it wasn't found in the SD table the first time, in the event it was found in the recent table, it is delivered back to the SD table.

Q. And can you remind us what that

spinning gear was in the animation?

A. This is the Purity software.

Q. So the Purity software is taking the identifier to compare it against the SD table and then compare it against the recent table and if the segment is determined to be a duplicate, it is in your view delivering it back to the SD table?

MR. VAN NEST: Objection. Leading, Your Honor.

THE COURT: All right. I'll sustain it.

BY MR. ROSENBERG:

Q. Mr. Jestice, in which point in your diagram do you view constitutes delivering back to the SD table?

A. It's exactly the same as in my diagram, the modified Pure Storage diagram, in step three when we take the identifier and put it back in the SD table, deliver it back to the SD table is the step.

Q. Okay. Mr. Jestice, a few minutes ago you mentioned you think there's another way that the Purity software meets this claim

element of delivering back the identifier; is that right?

A. Yes, that's correct.

Q. And what is that other way?

A. So the Pure Storage expert says that the, there's a requirement to have a return statement, which is a very specific computer instruction.

Q. What is a return statement?

A. It's an instruction. I talked a little bit about the subroutines, where you try to split your program up into distinct parts. At the end of one of these subroutines or functions, there's frequently a return statement, which is the exit from that function.

Q. And with reference to what's on the screen, is this what a return statement might look like?

A. It may. A return statement can return nothing or it could return some value.

Q. Is there a return statement in the Purity software that you've looked at in connection with this delivering back or returning the identifiers?

A. Yes, there is.

Q. And in your opinion, does that return statement meet this claim step of returning the identifier?

A. Yes, that also meets this claim step.

Q. How does it do that?

A. Because the claim requires delivering back the identifier and that the return statement returns the identifier back in the form of an index.

Q. What is an index?

A. An index is an address within an array. It's sort of like a pointer to the actual data.

Q. And how does returning the index in your view meet the step of returning the identifier?

A. Well, in computer science terms or in computer programming terms, if you return the index, you have the identifier.

Q. So does this return statement in Pure Storage's source code that returns the index to the identifier literally in your view

meet the claim language returning the identifier?

A. Yes, it does. It returns the identifier.

Q. Does Pure Storage agree with you about whether returning the index literally meets this claim step?

A. No, Pure Storage disagrees with me.

Q. Have you heard of something called the doctrine of equivalents?

A. Yes, I have.

Q. Is it your understanding that under the doctrine of equivalents, an accused product can meet a claim limitation even if it doesn't meet it literally, as long as it performs substantially the same function in substantially the same way to achieve substantially the same result?

A. Yes, that's my understanding.

Q. And do you have an opinion as -- about whether the return statement in Pure Storage's source code that returns an index to the identifier infringes this claim step under

the doctrine of equivalents?

A. Yes, I believe it does. Because it does, performing substantially the same function, it returns an index and it does do it substantially the same way in that it returns the index in the event that there's a match. And the result is that you have an identifier that you can use for other things, so substantially the same result.

Q. And so if we now turn back to the claims, can we summarize, do you have, in your opinion, two reasons why you believe that the returning the identifier step of Claim 32 is met by Pure Storage's software in its FlashArray products?

A. Yes, my opinion is it's infringed in both ways that I stated, which is returning the identifier, delivering back the identifier to the SD table and in the return statement.

Q. So we'll put a checkmark up there. And to summarize, is your opinion that Pure Storage products infringe this claim?

A. Yes, my opinion is that Pure Storage products infringe all of the elements of

claim 32 of the '464 patent.

Q. Mr. Jestice, do you have an understanding that there are different acts that can infringe a patent claim?

A. Yes, I do.

Q. Do you have an opinion about whether Pure Storage infringes this claim by making all of the accused FlashArray products in the United States?

A. Yes, they do. They infringe by making the products in the United States.

Q. And is it also possible to infringe a patent claim by using or selling or offering to sell the patented product in the United States?

A. Yes. My opinion is that they infringe the patent by making, selling and offering to sell the products in the United States.

Q. Okay. Mr. Jestice, now that we have talked about infringement, I would like to turn to the issue of noninfringing alternatives?

THE COURT: Mr. Rosenberg, I'm thinking maybe this is a good time for lunch.

Is it?

MR. ROSENBERG: Absolutely.

THE COURT: Members of the jury, we are going to take a one-hour lunch break now, and then we'll resume at 12 minutes of 2:00. All right. Let's take the jury out.

(Jury leaving the courtroom at 12:48 p.m.)

THE COURT: All right. Mr. Jestice, you can step down.

Everyone be seated. Is there anything that anybody wants to talk about?

MR. VAN NEST: No.

MR. KREVITT: None for the plaintiff at this time, Your Honor.

MR. VAN NEST: We're okay, Your Honor.

THE COURT: All right. Just in terms of actually finishing Mr. Jestice, which I assume will happen sometime this afternoon, what's next?

MR. KREVITT: Mr. Birmingham, who was the inventor on the '556 patent.

THE COURT: Okay. And do you

think that's going to take us through the rest of the day?

MR. KREVITT: I'm not sure. Then what we were thinking if not is that we would move to Mark Jones, our expert on the '556 patent. Almost certainly that would take us to the end of the day.

THE COURT: I think that's a reasonable bet. All right. I'll see you all again in a little less than an hour.

(A luncheon recess was taken.)

THE COURT: All right. Please be seated. Are we ready to bring the jury in.

MR. VAN NEST: Your Honor, it's awfully warm in here, I'm reflecting that for everybody.

THE COURT: I noticed it when I walked in and I have asked the deputy, courtroom deputy to contact building management, offer them more money and see if we can't lower the heat.

MR. VAN NEST: Thank you.

(Jury entering the courtroom at 1:53 p.m)

THE COURT: Members of the jury, welcome back. Everyone you may be seated. I'm not sure if they turned the heat on while we were out to lunch, but we are going to try to get it lowered, but that takes a little bit of time.

Go ahead, Mr. Rosenberg.

MR. ROSENBERG: Thank you, Your Honor.

BY MR. ROSENBERG:

Q. Welcome back, Mr. Jestice. Before lunch we were talking about infringement of the '464 patent and your opinion that the Purity software meets every step or element of claim 32 of the '464 patent.

I would like to turn now to a separate issue called noninfringing alternatives. Do you have an understanding of what noninfringing alternatives are in a patent case?

A. Yes. My understanding is that they are suggestions in this case put forward by Pure Storage of ways they could change their products so they would not infringe the patents.

Q. These are not questions about whether the actual designs of the products infringe, but rather whether alternative designs would have infringed; right?

A. That's correct.

Q. Have you considered whether Pure Storage had available to it acceptable noninfringing alternatives to the asserted claims of the '015 and '464 patents?

A. Yes, I have.

Q. And what have concluded?

A. I concluded that they would still infringe the patents of the '464 and the '015.

Q. And in order to help you explain that, I know we have talked about the '464 and your opinion on infringement. We have not talked about the claims of the '015 patent. I understand you're not here to offer an opinion about infringement of that patent.

Is it your understanding that the parties agree that there are claims of the '015 patent that are infringed?

A. Yes.

Q. To help explain your opinions

about whether the alternatives proposed by Pure Storage would still infringe, I would like to have you explain to the jury what the patent claim of the '015 patent here says. Can you tell us what the first part of claim 1 of the '015 patent up there on the screen says and what it means?

A. Yes. This is a method for storing data comprising, receiving a data stream comprising a plurality of data segments.

Q. Can you show us how that relates to a data storage system, for example, the illustration we have been using?

A. This is the same diagram I used before with hosts on the left generating data, an interface between them that transmits a data stream which is a plurality of data segments and then there is a controller and storage segments that manage and store the data.

Q. And then moving back over to the claim, after the data stream has been received, what's the next step recited in claim 1 of the '015 patent?

A. Assigning an identifier to one of

a plurality of data segments.

Q. How does that relate to the claim, or I'm sorry, the illustration we see here?

A. This is exactly the same as before, a segment comes into the storage controller and an identifier, in this case it's like a name tag, Ed we have associated with that segment that contains the data, P2 for this illustration.

Q. And the name tag, the identifier here is Ed?

A. Ed, yes.

Q. And then the last step of claim 1 of the '015 patent is determining whether one of the plurality of data segments has been stored previously using a summary, wherein the summary is a space efficient probabilistic summary of segment information. Do you have an understanding of how that step relates to the concept of preliminary checks?

A. This is the preliminary check.

Q. When would that happen in an example of a storage system?

A. Right here. It would take, it

would take the identifier and then use that as a preliminary check to see if it's been stored before.

Q. And Mr. Jestice, the Court has provided constructions for some of the language in the claim we just looked at; is that right?

A. Yes, they have.

Q. And we haven't looked at those because of course you haven't offered and you are not here to put in an opinion about whether the products infringe, but I want to go back to the word identifier here. Do you recall the Court having construed the identifier to mean information that identifies?

A. Yes, I do.

Q. And now moving forward to the alternatives that Pure Storage has proposed, do you understand this list to reflect alternatives that Pure Storage, and specifically its expert, Dr. Zadok, have proposed for ways in which Pure Storage supposedly could have redesigned its inline deduplication process to avoid infringing the patents?

A. Yes. There is actually two sets

because they have offered two solutions, one for the '015, one for the '464, so they're arranged in two columns here.

Q. On the side on the left there where it says the '015, these are things that Pure Storage's experts says Pure Storage could have done to change or redesign their inline deduplication process to avoid the claim we just looked at in the '015 patent; right?

A. That's correct.

Q. Are these changes things that Pure Storage has actually done, has Pure Storage actually made these two changes to its inline deduplication products as far as you know?

A. As far as I know, they haven't made these changes.

Q. In your opinion, if Pure Storage had made either of those two changes to its inline deduplication products, would that have resulted in a noninfringing product with respect to the '015 patent?

A. In respect to the '015 patent, no, it still would have infringed.

Q. Why not?

A. Well, the first noninfringing suggestion was assign hash values to multiple sector blocks of data, there is nothing in the patent that says that the sets have to be a certain size, they can be 512 bites or any size. They can also be variable. There is also no -- there is no reason that that has to be hash values, why it would not work if hash values were associated with multiple sectors.

Q. What about the second alternative listed on the left side of the screen?

A. Again, in the patent it talks about variable length sectors, and sliding windows of data.

Q. And Mr. Jestice, has the fact that Pure Storage has not actually changed its inline deduplication process in either of those two ways informed your opinion about whether they would have been acceptable solutions?

A. I have some questions whether it would work, but no, it hasn't changed my opinion.

Q. So if you'll allow me, I'll put strike marks through those to indicate your

opinion that those are not noninfringing alternatives.

If we turn to the '464 patent, on the right side here, is it your understanding that these are ways in which Pure Storage's expert says Pure Storage could have changed its inline deduplication process to avoid infringing the claim of the '464 patent we looked at earlier, claim 32?

A. Yes, that's their suggestions were changing the code so they would not infringe the '464.

Q. Have you seen any indication that Pure Storage has actually made any of these four changes to its inline deduplication process?

A. No, I have not.

Q. So these are things Pure Storage says it could have done, but Pure Storage did not actually do?

A. Correct.

Q. In your opinion, if Pure Storage had made these changes, any one of these changes to its inline deduplication process, would that have made the inline deduplication process an

acceptable alternative to the '464 patent?

A. No, it would not.

Q. Why not?

A. Well, the first choice, the reverse order in which they are performed still has the return statement. The modifying code to eliminate recent stable and just rely the SD table also still has the return statement.

The perform deduplication against a single table stored in relatively high latency memory, I believe would still require a hash filter that would also be a subset of the identifiers in the latency memory, so I think that would infringe and still be a return statement.

The suggestions for removing or changing the code for return statement, I don't believe actually does remove the return statement. And you -- and the final suggestion, because there is actually two suggestions in there, would be a violation of coding standards.

Q. Mr. Jestice, if Pure Storage had made the changes on the right side of the screen there, has Pure Storage's expert expressed a

view that making those changes would do anything to avoid infringing the '015 patent on the left?

A. No, the ones on the right have been suggested for only the '464 patent.

Q. And it's your opinion that those changes would not result in acceptable noninfringing alternatives for the '464?

A. That's correct.

Q. I'll put a line through those to illustrate that.

Other than what's listed on the screen here, has Pure Storage's expert, Dr. Zadok, proposed any other changes Pure Storage could have made to its products to avoid infringement?

A. Yes, he's proposed removing inline deduplication completely.

Q. So not changing inline deduplication in the ways described here, but simply removing inline deduplication as a feature?

A. Yes. He has discussed disabling it, but ultimately he would remove all the code from the Purity software.

Q. And do you think that taking out or disabling or removing the inline deduplication feature from the Pure Storage products would have been an acceptable alternative to using inline deduplication under the claims?

A. I don't believe it would be acceptable.

Q. And earlier you had discussed some advantages that inline deduplication has over background deduplication. Do those advantages relate to your opinion about whether taking inline deduplication out would have been an acceptable alternative?

A. Yes. The end result of taking inline deduplication out would be that the data would initially be written to the storage element and that causes using more storage and secondly it would wear the storage out faster, so neither of -- both of those things would increase the price of the product.

Q. And so taking inline deduplication out and relying only on background deduplication in your view wouldn't have been an acceptable

way to make a product; is that right?

A. That's correct.

Q. Okay. You understand that Pure Storage's expert witness, Doctor Zadok, disagrees with you about that?

A. Yes, he does.

Q. Okay. Have you seen any information from Pure Storage outside the courtroom that reinforces your view that taking inline deduplication out of the products would not have been acceptable?

A. Yes, I have.

Q. Okay. Do these statements relate to your views on that?

A. Yes. This is.

MR. VAN NEST: Objection. Your Honor, 702. This is not expert testimony.

MR. ROSENBERG: It is, in fact, Your Honor. Relates to the question of whether this technology is essential, mandatory, key, such that removing it would not result in an acceptable product.

THE COURT: I'm going to overrule the objection.

BY MR. ROSENBERG:

Q. So Mr. Jestice, can you remind us who is Scott Dietzen.

A. He is the CEO of Pure Storage.

Q. What has he said in these blog posts that you find relevant to your opinion about whether taking inline deduplication out of Pure Storage's products would have been an acceptable alternative?

A. He says deduplication is key. Inline deduplication is essential and inline, submillisecond deduplication is mandatory.

Q. And what does this indicate to you about whether Pure Storage's view about whether taking inline deduplication out of the product would have been an acceptable alternative?

A. They don't think it would have been acceptable.

Q. In addition to these blog posts -- let me stop and have you look at Exhibit 31.

A. PTX-31?

Q. 31.

A. Yes, I have it.

Q. And is this the blog post shown on

the left side of the slide?

A. Yes, it is.

Q. Okay.

MR. ROSENBERG: Your Honor, we'd move PTX-31 into evidence.

MR. VAN NEST: I have no objection, Your Honor, to the admission of the exhibit, but I do object to using an expert to perform this task, 702.

THE COURT: So the exhibits are admitted without objection and the rest, any objection is overruled.

MR. ROSENBERG: And Your Honor, likewise, maybe to speed this along, we move into evidence the other two blog posts listed here, Exhibits 33 and 38.

MR. VAN NEST: No objection, Your Honor.

THE COURT: All right. Admitted without objection.

BY MR. ROSENBERG:

Q. Mr. Jestice, in addition to the information Mr. Dietzen wrote on the Pure Storage blog, did you also review Mr. Dietzen's

deposition in this case?

A. Yes, I did.

Q. And did he say anything in his deposition that you believe supports your view that removing inline deduplication from Pure Storage's products would not have been acceptable?

A. Yes, I did.

Q. And is this one of the statements he made in his deposition that you believe is consistent with your opinion?

A. Yes, he says deduplication is one of the essential techniques.

Q. Mr. Jestice, here Mr. Dietzen is only using the word deduplication, he doesn't say inline deduplication, right?

A. That's correct.

Q. And there are two different kinds of deduplication, inline and background, right?

A. Yes, there is.

Q. And the one we're talking about potentially removing here and whether that would be acceptable was inline deduplication, right?

A. That's correct.

Q. And so how do you know that this statement by Mr. -- I'm sorry, Doctor Dietzen is consistent with your view that Pure Storage views inline deduplication as an essential technique? Is there any information in Pure Storage's documents that supports your understanding?

A. Yes, there is.

Q. And is this one of the documents you reviewed that you believe supports your understanding of that statement?

A. Yes, it is.

Q. Can you explain how this document supports your understanding of doctor Dietzen's testimony?

A. Yes, this is a Pure Storage document and it says content deduplication with 512 byte geometry is roughly 95 percent.

Q. Is roughly 95 percent inline?

A. Inline and the remainder is done post-process, which is background.

Q. Okay. And so is it your understanding that Pure Storage is saying here that of the data that is deduplicated by the

deduplication features in the FlashArray, 95 percent of that data deduplication happens through the inline feature and not the background feature?

MR. VAN NEST: Objection. Document speaks for itself. Calling for speculation.

THE COURT: All right. Overruled.

THE WITNESS: When I read that document, that's what it says. It's 95 percent inline.

BY MR. ROSENBERG:

Q. And Mr. Jestice, did you also review testimony by a Pure Storage executive name Matt Kixmoeller?

A. Yes, I did.

Q. And did any of his testimony support your opinion?

A. Yes, it did.

Q. Can you please move the slide forward? And is this testimony given by Mr. Kixmoeller that you believe supports your opinion?

A. Yes, he said inline deduplication

is one of the mandatory features.

Q. And so this is Pure Storage talking about it's own products, correct?

A. Correct.

Q. And did you review any Pure Storage documentation as opposed to the testimony or the public facing blog posts, any Pure Storage presentations that support your view about removing inline deduplication?

A. Yes, I did.

Q. And is this one of the presentations you reviewed?

A. Yes, it is.

Q. Can you explain how this supports your view that removing inline deduplication would make the Pure products unacceptable?

A. This presentation is saying what's the secret sauce. And it's global inline deduplication.

Q. Mr. Jestice, were you in the courtroom earlier today when Doctor Li talked about the commercial success that Data Domain had?

A. Yes, I was.

Q. And do you understand that the patents, the deduplication patents, the '015 and the '464 Patents came out of the work that Doctor Li and his colleagues did at Data Domain?
A. Yes, that's my understanding.
Q. Okay. Do you have an opinion about whether Data Domain's own products, the deduplication products sold by Data Domain practice the '015 and '464 patents?
A. Yes. I've looked at the documentation and my opinion is is that the -- these main products do implement the '015 and '464 Patents.
Q. Did you look at products dating back to -- let me scratch that. When you were here earlier and heard Doctor Li testify, did you hear him testify about the first products Data Domain released in 2003 or 2004?
A. Yes.
Q. And is your opinion that the Data Domain products practice the '015 and '464 Patent, does that encompass the Data Domain products that were sold starting in 2003 and 2004?

A. Yes, it does.
Q. And does that extend to Data Domain products that were sold up until and through when EMC purchased Data Domain?
A. Yes, it does.
Q. Okay. And does it include Data Domain's products up until the present day?
A. Yes, it does.
Q. And is it your opinion that the Data Domain products practice the claims of the '015 Patent that are at issue in this lawsuit, specifically claims 1, 2, 7, 15, and 16 of the '015 patent?
A. Yes, that's my opinion.
Q. And is it also your opinion that the Data Domain products practice Claim 32 of the '464 Patent, the patent you showed us earlier how Pure Storage infringes?
A. Yes, that's my opinion.
Q. And in reaching your opinion that Data Domain's products practice these patents, did you consider any documentation about the Data Domain products?
A. Yes, I did.

Q. Did you consider a Data Domain technology and architecture overview?

A. Yes, I did.

Q. Can you turn to Exhibit 47 in your book?

A. Okay.

Q. 47. Is this the Data Domain technology and architecture overview that you reviewed when reaching your opinion that Data Domain's products practice patents?

A. Yes, it is.

MR. ROSENBERG: And Your Honor, we'd move Exhibit 47 into evidence.

MR. VAN NEST: No objection, Your Honor.

THE COURT: Admitted without objection.

BY MR. ROSENBERG:

Q. And did you also consider in forming this opinion a Data Domain document entitled compressed object store architectural specification?

A. Yes, I did.

Q. Can you turn to Exhibit 65 in your

binder, I think it's the next one. And is this the architectural specification you reviewed?

A. Yes, it is.

MR. ROSENBERG: Your Honor, we'd move Exhibit 65 into evidence.

MR. VAN NEST: No objection, Your Honor.

THE COURT: Admitted without objection.

BY MR. ROSENBERG:

Q. And in addition to this documentation about Data Domain's products, did you also consider testimony by the chief architect at Data Domain, Mahesh Kamat, about how the Data Domain products have worked?

A. Yes, I did.

Q. And do you believe his testimony supports your opinion that the Data Domain's products practice the asserted claims?

A. Yes, I do.

Q. And you mentioned you were here for Doctor Li's testimony about the commercial success of Data Domain. In your opinion, was the deduplication technology embodied in the

asserted claims of these patents and practiced by the Data Domain products the cause of the commercial success of Data Domain's products?

A. That's my opinion, yes.

Q. Mr. Jestice, have you seen statements by anyone in the storage industry that you believe support your view that the inline deduplication technology invented at Data Domain is an important technology in this industry?

A. Yes, I have.

Q. Have you seen statements by Frank Slootman?

A. Yes, I have.

Q. Who is Frank Slootman?

A. He was CEO of Data Domain, and I believe he's now on the board of directors of Pure Storage. And he wrote a book called Tape Sucks.

Q. And did you read that book?

A. Yes, I did.

Q. And is there anything written by Mr. Slootman in that book that you found useful in reaching your opinion that the inline

deduplication technology that you've testified was embodied in Data Domain's products is important technology in this industry?

A. Yes, I do.

Q. And is this one of those statements?

A. Yes. Frank Slootman says that Data Domain's landmark invention -- this was Data Domain's landmark invention.

Q. And you believe that's consistent with your view that the deduplication technology claimed in the '015 and '464 Patents drove the commercial success of Data Domain's products?

A. Yes, I believe Data Domain implemented all of the patents and their products' success was based on those patents.

Q. Mr. Jestice, has Pure Storage's expert, Doctor Zadok, said that it would be acceptable for Pure Storage to take inline deduplication out of its products and not do anything to substitute for its absence?

A. Yes, he has.

Q. Let me rephrase it. Is there anything Dr. Zadok has said Pure Storage would

do, would want to do, would have to do to substitute for the absent of inline deduplication if they took it out?

A. Dr. Zadok said that you need to increase the amount of storage to compensate for the lack of inline deduplication.

Q. And did Dr. Zadok also take a look at how frequently inline deduplication is currently used in Pure Storage's FlashArray products?

A. Yes. Pure Storage's FlashArray products communicate back to Pure Storage with statistics and information about their devices, and Dr. Zadok put together some information about which of the products ran inline deduplication and which did not.

Q. And did he observe a certain number of FlashArray products that he said were not using the inline deduplication feature?

A. Initially he said there was six that he had found on a particular day that did not use the inline deduplication feature.

Q. And is it true that those six FlashArrays never used inline deduplication?

A. No, that's not actually true.

Q. How many of them did use inline deduplication?

A. Well, there is some information provided that said that three of those at a later date were actually running inline deduplication.

Q. So of the six FlashArray devices that Dr. Zadok looked at, three of them in fact did use inline deduplication at some point?

A. At some point in time, yes.

Q. Were these the only six FlashArrays that Dr. Zadok had access to information about?

A. No, Dr. Zadok and the Pure Storage has 1,600 FlashArrays.

Q. And of those 1,600 FlashArrays, how many of them used inline deduplication?

A. All of them except for the three.

Q. So is that about 99 percent?

A. Yeah.

Q. Mr. Jestice, did these statistics about how many FlashArrays use inline deduplication and how many don't inform your

opinion about whether removing inline deduplication would be acceptable?

A. Yes. If only three out of the 1,600 arrays had it disabled, and I don't know why they were disabled and have not provided, been given any information as to why they were disabled, that indicates to me that the customers think that inline deduplication is really important.

Q. Mr. Jestice, has Dr. Zadok estimated the amount of extra storage that Pure Storage would need to add to its products in order to make up for the lack of inline deduplication if they took it out in his view?

A. Yes, he has.

Q. What has he said about that?

A. 6.58 percent.

Q. So his view is that if Pure Storage took inline deduplication out of the FlashArray products, Pure Storage could make up for that by adding about six-and-a-half percent additional storage capacity to its products?

A. That's what he says.

Q. Do you agree with that opinion?

A. No, I don't.

Q. Why not?

A. The data that we have been provided with that's coming back from the customers of these products is very limited. And Dr. Zadok has taken and analyzed that data and is considering an average usage through the systems he's looked at.

And this comes back to a task called capacity planning which is what I did at IBM and what I did at my startup company. You need to look at the peaks to find out the maximum usage, and then add some percentage to that. So his analysis was flawed because it -- when you considered the averages of some of the products he looked at.

Q. Mr. Jestice, you said you need to look at the peaks. Can you explain a little bit more about what you meant by that?

A. Yes, there is two aspects when you're trying to decide how much computer storage you'll need. One is benchmarking, which is how fast this system goes and how much it can handle. The second is how much storage are you

going to need? How much data are you going to need? And you generally project forward for this.

So what you need to do is look at the maximum amount of data you're expecting to see and you can do that based on the maximum amount of data that you have already received and then project out future needs, but you got to start looking at those peaks.

For example, if you were looking to heat your house, you would look at the coldest season of the year to find out how much heating you need because it doesn't do any good saying on average it's going to be 30 degrees around here if you got some days that's going to be zero. You need to be able to bring the temperature up to a reasonable amount. The same with capacity planning, you need to be able to identify those cold days in order to provide enough capacity to not stop the operations of the computer.

Q. Mr. Jestice, did you make any effort to account for the peaks and follow Dr. Zadok's calculations, but consider the peaks

that you believe he left out?

A. Yes. I actually asked for some more data to try and identify that peak time and I was provided with some limited amount of data and then considering that not all those customers are going to hit peaks because it's going to be a unique calculation for each customer, I averaged out the peaks and came up with a different peak.

Q. Did you come up with a figure that's larger than six-and-a-half percent?

A. Yes, I did.

Q. Can you tell us what you came up?

A. In my estimation based on the limited data we have is 25.1 percent.

Q. What are these percentages? Are you saying that every FlashArray out there would have to have 25 percent more storage than the top of the line system or something else?

A. Each customer is going to be unique based on their workload. I'm saying on average customers are going to need 25.1 percent more.

Q. In order to accommodate peak

demands on those customers?

A. As currently seen based on today's data. You also got to factor in what their future needs are, but based on today's data, that's what they would need.

Q. Mr. Jestice, if Pure Storage had to actually buy 25 percent more storage capacity for each of its products, would Pure Storage be able to sell an acceptable product for would its customers be able to afford it?

A. Neither Dr. Zadok or Pure Storage believe that to be true and I also don't believe that to be true.

Q. Just to sum up your opinion here on noninfringing alternatives, Pure Storage and Dr. Zadok proposed some changes that Dr. Zadok believes Pure Storage could have made to keep inline deduplication, but do it differently; is that correct?

A. That's correct.

Q. And it's your opinion that if Pure Storage had made those changes, that would not have resulted in an acceptable noninfringing alternative; is that correct?

A. That's correct.

Q. And Dr. Zadok also suggested that Pure Storage could have removed inline deduplication completely to the FlashArray; is that correct?

A. That's correct.

Q. Is it your opinion that that would have resulted in an unacceptable alternative?

A. That's correct.

MR. ROSENBERG: Thank you very much, Mr. Jestice.

THE COURT: Cross-examination.

MR. VAN NEST: May I have just a moment, Your Honor?

THE COURT: Yes.

MR. VAN NEST: Your Honor, I have some binders for Mr. Jestice. May I pass them out?

THE COURT: Sure.

MR. VAN NEST: May I proceed, Your Honor?

THE COURT: Yes

CROSS-EXAMINATION

BY MR. VAN NEST:

Q. Good afternoon, Mr. Jestice.
A. Good afternoon.
Q. You frequently serve as an expert witness in cases like this; correct?
A. I don't know about frequently. I do.
Q. You do. The resume you provided shows about forty different expert assignments over the past several years?
A. Over the last fifteen years, yes.
Q. And, in fact, you do it enough that you have an agency that represents you as an expert; correct?
A. Actually I think like most experts I have several agencies that represent me.
Q. And those agencies help you find and then manage expert assignments; right?
A. Yes.
Q. And they get a cut of whatever you're paid by EMC for that service?
A. Yes, they do.
Q. And you're represented by an agency in connection with this case as well?
A. Yes, I am.

Q. And over the course of your expert work through agencies and otherwise, you have actually testified about many different types of products, fields and technologies; correct?
A. I have testified about software 99 percent of the time.
Q. You have testified about home appliances?
A. Can you tell me which case?
Q. It was spin dryers?
A. That was software.
Q. Softwares that run home appliances?
A. That's correct.
Q. And the game programing?
A. Software that runs a game program, yes.
Q. LED monitors?
A. Which case was that?
Q. I believe it's listed on your resume, LED monitors was Faulk versus TPV.
A. For that case I wrote software to measure the latency of an LED, yes.
Q. In any event, you testified about

a wide range of products over the course of your career; correct?

A. I testified on software for a wide range of products, that's correct.

Q. And this is not the first time that you have served as an expert for EMC, is it?

A. No, it's not.

Q. You have testified in four different cases just for EMC alone; right?

A. That's correct.

Q. And over the course of those cases, all of them, you have earned several hundred thousand dollars as an expert witness; correct?

A. That's correct.

Q. So they have become a good repeat customer for you?

A. EMC doesn't generally pick me, I'm picked from the agency.

Q. But the agency has picked you for four separate EMC cases; correct?

A. Different agencies pick me for different cases.

Q. Now, you have never actually published a paper on storage or storage systems in any sort of peer reviewed journal, have you?

A. No, I haven't.

Q. You have never taught a course at college or university about storage?

A. Not a college or university, no.

Q. And you have never attended the FAST conference that we heard Dr. Li testify about this morning; right?

A. No, I have not.

Q. And as a matter of fact, that's the conference that storage technologists and executives attend each year?

A. I don't know anything about that conference other than what I have read.

Q. That's something you're not even familiar with; correct?

A. Correct.

Q. Now, let's get right to your infringement opinions, Dr. Jestice. Obviously in order to establish infringement, you need to show that all of the elements of the claim are present; right?

A. That's correct.

Q. And EMC as the plaintiff has burden of proof in doing that?

A. Yes, they do.

Q. So if even one element is missing, there is no infringement; correct?

A. That's correct.

Q. And you've given opinions here today about claim 32 of the '464?

A. Yes, I have.

Q. And you have given an opinion that the Pure Storage products literally infringe that claim; right?

A. Yes, I have.

Q. And to establish literal infringement means that the limitation is met if it exist in the product just in the way it appears in the claim; right?

A. Yes, that's correct.

Q. So it can't be close, it's got to be just the way described in the claim itself for literal infringement; right?

A. Yes.

Q. Now, as we discussed, could I have

claim 32 up from DTX 18, please. You were here when I gave my opening statement; right?

A. Yes, I was.

Q. And you heard me say this was the significant element of this claim?

A. Yes.

Q. And this is the one that's in dispute?

A. Yes, it is.

Q. And by the way, this element is not in the other patent that you and Mr. Rosenberg talked about, the '015 patent does not have this element; right?

A. That's correct.

Q. This is unique to the '464?

A. Between the two, yes.

Q. And so again, if FlashArray does not meet this limitation, there is no infringement of claim 32 of the '464; right?

A. Yes, I agree.

Q. And the only claim that you're asserting from this patent is this claim 32?

A. Yes, it is.

Q. So this is the only real issue on

infringement that our jurors have to resolve in connection with at least the '464 patent; right?

A. That's correct.

Q. Now, the Court has defined for us what returning the identifier means; right?

A. That's correct.

Q. And you have taken that definition into account in performing your evaluation; right?

A. Yes, I have.

Q. The term return or returning as used in the patent means deliver back, or delivering back; right?

A. That's correct.

Q. Let's go back to the claim, please. That requires that the identifier that's been assigned to the data segment be returned and delivered back; right?

A. It says delivering back the identifier, by the Court's claim construction.

Q. And you have pointed to a multistep process in Pure's device that you say satisfies this claim limitation; right?

A. That's correct.

Q. And that process involves checking and then updating the SD table, right?
A. It involves checking the SD table, checking the recent table and then updating the SD table.
Q. All right. Can we pull up Mr. Jestice's slide from this morning's presentation? I want to get one of your graphics up, Mr. Jestice, so we know. This is what you presented, part of what you presented to our jurors this morning, right?
A. Yes, that's correct.
Q. And what you show is in this example the identifier is the name tag, hello Ed, right?
A. Yes.
Q. And this is sort of, I don't want to demean it, but sort of a cartoon to show what's happening in the Pure Storage device?
A. Yes, it is.
Q. You didn't actually show us any source code in connection with your testimony?
A. No.
Q. Right. But in order to understand

how the device works, you'd have to look at source code ultimately, right?

A. Yes.

Q. And the source code is what the engineers use to write the programs that operate the system, right?

A. That's correct.

Q. And that's one of the things you looked at in forming your opinions?

A. That's correct.

Q. Now, it's true, isn't it, that at the start of this process the identifier is not actually in the SD table, correct?

A. It's not stored in the SD table, that's correct.

Q. May I have the laser pointer, please. So here's the SD table and here's the recent table. At the start of this process that you have described as constituting the infringement, the identifier is not stored in the SD table, correct?

A. That's correct.

Q. And you're showing an arrow from the SD table to the recent table. That's arrow

two. Do you see that?

A. Yes, it is.

Q. Actually the SD table can't send anything anywhere, it's just a memory, right?

A. I didn't say that it was sending anything anywhere.

Q. Okay. So you didn't mean to imply by this arrow labeled two, that this identifier was actually moving from this table to this, right?

A. The Purity software is moving its focus from the SD table to the recent table.

Q. But the SD table itself isn't sending anything anywhere, right?

A. The SD table is a table, it's not capable of sending anything anyway.

Q. Right. And the recent table, it's a table too, it's not capable of sending anything anywhere either?

A. I didn't say it was.

Q. Right. So this arrow you're showing as running from the recent table back to the SD table, it's not actually sent there by the recent table because the recent table can't

send anything anywhere, right?

A. It's the Purity software that is going from the SD table to the recent table and then back to the SD table.

Q. But these arrows aren't intended to reflect movement between these tables, right?

A. Yes, they are.

Q. Well, let me back up a minute. They are not intended to reflect that the SD table sends anything anywhere, right?

A. They are intending to reflect that the Pure Storage software, the Purity software is moving and checking first in the SD table, then the recent table and then the SD table.

Q. Okay. So let's get this clear for our jurors. The Purity software is operated by the controller in the Purity device, right?

A. Yes, it is.

Q. That's what performs all these functions, the controller?

A. Yes, it is.

Q. These tables can't do any comparing of anything because they are just tables, right?

A. That's true.
Q. And they can't send anything anywhere because they are just tables, right?
A. That's true.
Q. It's the Purity controller that's doing the work?
A. The Purity software is doing the work.
Q. Okay. As executed through the controller?
A. And it's being executed through the controller, yes.
Q. Now, I think you told us that at the start of this process that you say infringes, the identifier is not stored in the SD table, correct?
A. That's correct.
Q. So that means when the update happens, the identifier is being placed into the SD table for the first time?
A. It is being -- well, yes, it's being stored in the SD table for the first time.
Q. And it's being placed there by the operation of the controller on the software,

correct?

A. By the Purity software it's being placed there, yes.

Q. Right. But it's being placed there for the first time?

A. As far as we know, yes.

Q. And you call that delivering back, right? That's your opinion?

A. That's my opinion.

Q. Okay. But you concede, one, it was not in the SD table to begin with, correct?

A. I agree, yes.

Q. And two, when it is updated there, that's the first time it's being returned anywhere?

A. That's what I said, yeah, that's my opinion.

Q. Now, actually there isn't much dispute between you and Doctor Zadok about how the system works, correct?

A. If there is it's very small.

Q. All right. As a matter of fact, there isn't really a technical dispute between the two of you about how the software in the

system works, right?

A. There's a dispute about the return.

Q. Indeed. Of course. Let me rephrase it. In terms of how the software operates in the device, you and Doctor Zadok agree?

A. Yes.

Q. Okay. It's the interpretation of that where the disagreement comes in, right?

A. Yes, it is.

Q. Now, and you prepared an opening report in connection with your work on this case, correct?

A. Yes, I did.

Q. And you understood the rules required you to put your opinions out in writing?

A. Yes.

Q. And to support them with whatever information you needed?

A. Yes, I did.

Q. And to explain the bases for your opinions, correct?

A. Yes.

Q. And in discussing this element of infringement, you listed one line of code, right?

A. Yes.

Q. Could we have paragraph 181 from Doctor Jestice's opening report, paragraph 181. I think it's the next paragraph. It's 180. I'm sorry. My fault. This is the paragraph from your opening report in which you discuss this process, correct?

A. I was just going to check.

Q. I handed you your report. That's your opening report. It should be in there at paragraph 180.

A. Okay. I'm there.

Q. Okay. And very last -- can you identify the very last sentence?

A. Yes.

Q. That's the one line of code and the only line of code that you cited in connection with this element of your analysis in your opening report, correct?

A. In my opening report, that's

correct.

Q. And then Doctor Zadok got a chance to do a report, correct?

A. Yes.

Q. And he wrote several paragraphs describing how the source code operates the deduplication function in Pure's software, right?

A. Yes, he did.

Q. And he cited many of the modules that are used to operate deduplication, right?

A. Yes.

Q. He cited the code?

A. I would have to go back and look at his report, but most likely, yes.

Q. We can look at it, if you want. Do you remember that he cited quite a bit of the code from deduplication?

A. Yes, I do.

Q. Paragraph after paragraph of it, right? Correct?

A. That's correct.

Q. Okay. And you didn't have any disagreement with what he set forth as to how

the source code for deduplication works in Pure Storage's device, right?

A. That's correct.

Q. You were in agreement when you looked at all the source code that he laid out, your conclusion was he's right, that's how it works, correct?

A. Well, I was looking at the source code in total, and yes, I agree.

Q. Okay. And one of the things that you agree with in Doctor Zadok's report is that none of the deduplication source code routines that he identified directly return the actual identifier value to their calling routine, right?

A. I have to go back and look at the references.

Q. Well, didn't you testify in your deposition that after looking at all of Doctor Zadok's analysis you agreed with his conclusion that none of the source code in the deduplication modules directly returns an actual identifier to its calling routine?

A. So you're talking about a return

statement?

Q. That's right, I am.

A. Yeah, I agree.

Q. And you agree with that?

A. With the computer return statement, yes.

Q. Okay. And you actually testified that none of the duplication source code routines identified by Doctor Zadok directly return the identifier to its calling routine in terms of a return statement, right?

A. That's correct.

Q. Now, you didn't actually show us any source code this morning, right, during your testimony?

A. That's correct.

Q. You showed us a graphic that said return P, right?

A. It wasn't a piece of source code.

Q. Okay. Can we put up the graphic that we saw this morning. Return (p). Now that's not actually evidence; right?

MR. ROSENBERG: Objection, Your Honor. Objection to that as argumentative.

THE COURT: I'm going to overrule the objection.

THE WITNESS: It's just an example of the return code, any return code.

BY MR. VAN NEST:

Q. But you actually identify in your report some specific source code that you said performed a return; right?

A. Yes.

Q. And that's the one line of code we looked at this morning, or we looked at just a moment ago?

A. That's correct.

Q. You didn't even show that to the jury; right?

A. That's correct.

Q. And one reason for that is that that code doesn't actually return the identifier anywhere, it returns an index?

A. It returns an index as an identifier.

Q. But it doesn't return an identifier itself; right?

A. Yes, it does.

Q. Let's actually put up the source code, I think it's in 905, DTX 905. Can we blow that up a little bit.

So this is the source code, this is the only line of code that you identified anywhere in your various reports that you say performs a return in connection with this claim; right?

A. That's correct.

Q. And first off, in your report, you didn't even explain what this return does, did you?

A. That's correct.

Q. And you didn't even bother to tell our jurors this morning what it does, either; right?

A. That's correct.

Q. One thing we know for sure is that this is not the code that updates the SD table; right?

A. The code I was looking for was a return of the identifier.

Q. My question was, Mr. Jestice, this code is not involved in the update of the SD

table that you told us was the infringing function; right?

A. It's completely separate.

Q. It's completely separate. So just so there is no confusion, this code is not involved in updating the SD table in Pure's products; right?

A. That's correct.

Q. That means with respect to your opinion about infringement, with respect to updating the SD table, you haven't provided us with any source code; right?

A. They're completely separate.

Q. But you haven't provided us with any source code explaining how the SD table update occurs?

A. That's correct.

Q. What you have shown us was the cartoon that we saw on the screen a little bit earlier?

A. That's correct.

Q. Now, obviously -- strike that.

You have also expressed an opinion that this line -- let's put the line of code

back up because -- excuse me, we'll stay on it.

You've expressed an opinion that this line of code constitutes infringement under the doctrine of equivalents; right?

A. Yes, it does.

Q. Now, the doctrine of equivalents is something that you can fall back on if there is no literal infringement; right?

A. That's true.

Q. So normally if an expert believes that it's certain that his opinion establishes literal infringement, there is no need to resort this to; right?

A. Dr. Zadok disagrees with me on my interpretation.

Q. He disagrees with you on everything; right?

A. He disagrees with me on return statement.

Q. He disagrees with you on deliver back; right?

A. That's the return.

Q. Well, I think we have established this line of code doesn't update the SD table?

A. That's correct.

Q. Now, you understand that to establish equivalents, you must show that the accused feature is performing the same function in the same way to get the same result; right?

A. Substantially the same function.

Q. Fair enough. Substantially the same function, substantially the same way, substantially the same result?

A. That's correct.

Q. So the requirement of the claim is that you deliver back the identifier if a match is found?

A. Correct.

Q. And the functionality that you have identified in Pure Storage that you say performs that is updating the SD table?

A. That's one way it infringes.

Q. Your opinion is this is a totally separate different way that it infringes; right?

A. That's correct.

Q. Even though you haven't told us what it does; right?

A. I have identified as the line of

code that returns the identifier.

Q. But again, all this code returns is an index?

A. It returns the identifier as an index.

Q. Now, at the time you formed your opinion, did you even know what this line of code served as in the deduplication process at Pure?

A. Did I understand where it fits into the system?

Q. Yes.

A. I could tell you, yes.

Q. But you certainly didn't describe in your report what function it performed; right?

A. I didn't need to describe in my report, I'm identifying the code that does the return.

Q. And, therefore, you didn't?

A. Correct.

Q. Now, apart from this line of code and your opinion that updating the SD file infringes, that's the limit of your reasons for

finding infringement of claim 32; right?
A. It's the last element of the claim, the one that's in dispute.
Q. But we have covered the scope of what you say constitutes that infringement, it's this one line of code and the SD table update; right?
A. That's correct.
Q. Nothing else; right?
A. Yes, I said that was correct.
Q. Now, you testified, Mr. Jestice, that Data Domain products practice the '464 and '015 patents; is that correct?
A. That's correct.
Q. Did you actually look at scores code for the Data Domain products?
A. No, I did not. It wasn't available to me.
Q. It wasn't available?
A. It was not made available to me.
Q. But the owners of that code are EMC; right?
A. That's correct.
Q. That's who you're working for?

A. That's correct.
Q. Did you ask anybody to let you see the source code from the Data Domain products?
A. The architectural specification in this case were good enough.
Q. So you didn't need to look at the source code?
A. Not for those products.
Q. And therefore, you didn't?
A. That's correct.
Q. And you didn't even ask?
A. That's correct.
Q. So it's not that they weren't made available as you just told me, it's that you didn't ask for them; right?
A. That's correct.
Q. Now, you understand that Data Domain doesn't manufacture any storage device today that's all Flash; right?
A. That's my understanding.
Q. They manufacture the older variety, magnetic spinning disks. Different variety?
A. Different.

Q. They're not in the all-Flash market?

A. They're not.

Q. And as a matter of fact, their primary market is backup rather than primary storage which is what Pure and XtremIO do?

A. Correct.

Q. Not only are they using a different product, but they're in a different market, too?

A. I'm not an expert in that field, but I would agree with you.

Q. You're not an expert in marketing?

A. Correct.

Q. Now, have you ever analyzed whether EMC's Flash product, XtremIO, practices the patents?

A. No, I have not.

Q. So you don't have any opinion on that?

A. No, I don't.

Q. And you weren't even asked by anyone at EMC to analyze that; right?

A. That's correct.

Q. So based on all the work you have done, no one at EMC has ever suggested to you that their all-Flash product uses the '015 or the '464 patent; correct?

A. That's correct.

Q. And the Data Domain patents that you analyzed, the '015, the '464, they make no mention of Flash at all; right?

A. Not specifically, no.

Q. Not even a general mention of Flash?

A. Flash is a storage device.

Q. Now, I want to explore the last opinion you expressed about capacity. You did a capacity analysis; correct?

A. Well, yes.

Q. Now, capacity is ultimately a question for customers; right?

A. Well, the customers know what data they are creating, but they would work in conjunction with a vendor to decide how much storage they need.

Q. You mentioned that there is inline deduplication and background deduplication in

Pure's devices?

A. Yes, there is.

Q. And if you turn the inline off, the background processing will still run?

A. That's my understanding.

Q. And you're not accusing the background process of infringement; right?

A. No.

Q. So background processing is a non-infringing alternative, even in your view?

A. If you remove the inline dedupe code, yes.

Q. Okay. So it constitutes a non-infringing alternative that Pure could elect, if it chose to do that and you would agree that's non-infringing?

A. It's not an acceptable non-infringing use.

Q. Fair enough, but it is a non-infringing alternative, according to you, based on the technical analysis you've done?

A. Yes, if you actually pull the inline code, then it would not infringe.

Q. And that can be done, correct?

A. I don't know how to answer that. Anything is possible.

Q. Well, customers and Pure can turn inline off? In other words, as a technical matter, it's not a hard technical challenge to turn the inline deduplication off?

A. What you said was not correct.

Q. Well, let me put it this way. You looked at some systems where the inline had been turned off, right?

A. The inline can only be turned off by Pure Storage.

Q. Right, but it's not difficult for Pure Storage to turn it off?

A. No, that's true, but it's a different scenario if you're actually going to pull the code.

Q. In other words, it could be turned off instead of pulled and Pure Storage has the ability to do that?

A. But if it was turned off, it would still infringe.

Q. Okay. So in your view, you have to pull the inline code out?

A. Correct.

Q. Okay. But if you did that, it would be non-infringing?

A. It would be non-infringing, but not acceptable.

Q. Okay. And that's because you believe that if the inline were out, the customer would need 25 percent more capacity in order to have an acceptable performing device, right?

A. Based on the data that I've seen, limited data, that would be the average need.

Q. And I want to analyze how you got to that, because the comparable number that Doctor Zadok came up with was about 6 percent, right 6 and a half, 7, I think, right?

A. Yes, 6.57, I think.

Q. And you wanted to challenge, so you asked Pure Storage to provide data from its customers, right?

A. Yes.

Q. And what you asked for wasn't average data, you asked for data for the 10 worst days in the year?

A. That's correct.

Q. Okay. So what you said was for 23 of these FlashArray devices, give me the very worst day of the year from a standpoint of lots of volume being processed, correct?

A. Actually I asked for a lot more data.

Q. Okay.

A. But that's what we were given.

Q. But what you wanted was the worst day, the highest day, because you're looking for the peak?

A. That's what capacity planning is about.

Q. So you got the 10 days?

A. We got a 10 days.

Q. And that was from 23 different devices, right?

A. I don't remember the exact details. We can go and check my report.

Q. We're going to go and do that in just a minute. We'll do that. But you took those 10 days, and you didn't average the 10, you made a selection from within the 10 of 1 --

let me withdraw that. Let's go to paragraph 32 of Doctor Jestice's supplemental report. So it's your supplemental report, Mr. Jestice. And is there a chart? It might be in paragraph -- there it is. So I have up on the screen the chart that I want to discuss with you, Mr. Jestice.

A. I see it.

Q. From your report? That's from your supplemental report?

A. I'm not at the supplemental report.

Q. Okay. I'll represent to you that that's in, I believe paragraph 34?

A. Oh, I see, okay, yes.

Q. Okay. So we put this together. This is actually one chart that appears in your report, correct?

A. Yes.

Q. And there are 23 entries on it, because there were 23 separate arrays that you got data for?

A. That's all we got, yes.

Q. Right. And the data that you got

was for a full day in each case?

A. Only one day, yes.

Q. And you got -- but you got -- you got 10 days?

A. Yes.

Q. From each of the arrays?

A. Yes, out of the 8.

Q. So you didn't average those 10 days, right?

A. Absolutely not.

Q. And you didn't find the mean or the middle of the 10 days, right?

A. Absolutely not.

Q. You took the absolute worst day from the 10 worst days of the year?

A. Of course I did.

Q. Okay. And that's what's displayed here. This is -- these represent the very worst day out of the very worst 10 days of the data you got?

A. That's how you do capacity planning.

Q. And then you didn't even average those or take the mean of those, right?

A. That's correct.
Q. You picked the highest five of the 23?
A. That's correct.
Q. Right. So rather than take the 1.6 percent or the 1.4 percent, the highlighted ones are the ones you picked?
A. I'd have to go back and look why I dropped the others, but yes, that's what I did.
Q. Okay. So you essentially took the worst day of the worst 10 days and from that you chose the worst five days out of all these thousands of hours of information that you had, right?
A. I don't know if it's thousands of hours. From the limited information I had, I picked the worst ones, because that's what capacity planning is about.
Q. You started with the worst days and you picked the worst one, and then you picked the worst five out of those?
A. Yes, of course you do.
Q. Okay. And then you said well, that's what I think everybody should buy,

something for the worst of the worst of the worst, right?

A. No.

Q. You said that's the capacity you need to meet, the peak?

A. That's the average capacity that I estimated to meet the peak.

Q. And it's certainly not your -- you're not a marketing expert, right?

A. No, I'm not.

Q. You haven't talked to any Pure customers?

A. No, I haven't.

Q. You don't know how Pure designs their products?

A. No, I haven't.

Q. No. But does your opinion assume that they'll build 25 more capacity for every single one of the 1,600 customers regardless of whether they need it or not?

A. They would analyze each customer, which is what you would do as a capacity planner, which is what I did, and I would make recommendations to the customers for their

specific needs based on their work load and projected work load, so the only information I have is to average the very small amount of data that Pure Storage would give me.

Q. But it's not your opinion that the only way to make this noninfringing alternative work is to sell every customer 25 percent more storage; right?

A. No. I'm saying on average your storage will have to sell 25 more storage for their customers. Some will require more.

Q. And that average you got was picking the ten worst days and selecting the worst one of those and then the worst five of those to get your number?

A. Absolutely. That's my job?

MR. VAN NEST: I have nothing else, Your Honor.

THE COURT: Any redirect, Mr. Rosenberg?

MR. ROSENBERG: Yes, Your Honor.

REDIRECT EXAMINATION

BY MR. ROSENBERG:

Q. Mr. Jestice, you see the 44

percent number at the top right-hand number of the slide?

A. Yes, I do.

Q. So in the data provided by Pure Storage, did you see instances in which it would have taken more, in fact, more than twice what you came up with in terms of extra capacity to meet peak demand?

A. For that particular storage array would have needed 44 percent.

Q. And what would happen to a FlashArray customer if the FlashArray experienced the peak demand that they didn't have the capacity for?

A. They would get a message saying I'm out of space.

Q. Would that be in your view acceptable to the Pure Storage customer trying to use that FlashArray?

A. If you were a large enterprise customer that ran out of space, I think you would have a serious conversation with your capacity planner.

Q. Why in your opinion would Pure

Storage have needed to provide 21 percent more storage on average for its customers if it had taken inline deduplication out?

A. Because if you take the limited data we had, I average out the worst case because that's what you do in capacity planning.

Q. Mr. Jestice, I would like to turn back to the questions Mr. Van Nest asked you about the opinions you have about infringement. Earlier today you told us about the two different ways in which you believe the Purity software performs the returning identifier step, do you remember that?

A. Yes, I do.

Q. Is source code related to both of those?

A. Source code is related to the actual flow of data back into the SD table. It's only important as far as Dr. Zadok saying I need a return statement, which I found.

Q. Did you examine the Pure Storage source code before you reached your opinions about both of the kinds of infringement you believe are occurring?

A. Yes, I spent multiple days looking at source code.

Q. In fact, during your direct examination today, didn't you identify for us the name of the source code function that is involved in what you consider to be delivering the identifier back to the SD table?

MR. VAN NEST: Objection. Leading, Your Honor.

THE COURT: Why don't you just change the question to what is the --

BY MR. ROSENBERG:

Q. Mr. Jestice, did you identify for the jury earlier today the source code function or method that Pure Storage uses to deliver back the identifier to the SD table?

MR. VAN NEST: Same objection, Your Honor.

THE COURT: Ask him what it is and you'll know whether he did it before.

Q. What is the name of the source code function or method that in your view returns the identifier to the SD table?

A. I identified two functions, one of

this is the hash tag look up, which is the function that looks up the identifier tables and compared dedupe which is the comparison of the data that's been stored against the data that's been received.

Q. And Mr. Van Nest asked you some questions about your second theory or the second way in which you expressed an opinion that Pure Storage product meets the returning step. In your opinion does the return statement that you identified need to be related to the SD table in order for Pure Storage software to meet the returning step under that theory?

A. No, it does not.

Q. And in addition to that, do you have a view about whether the asserted claim here, in particular the returning the identifier step, requires a return statement at all?

A. It does not.

Q. Mr. Jestice, Mr. Van Nest asked you some questions about whether the table, specifically the SD table and the reset table send things. Do you recall that.

A. Yes, I recall that.

Q. Can we put up a slide with claim 32 of the patent. So if we actually look at the returning the identifier step, what is it that claim 32 requires to perform the step of returning the identifier?

A. Can you rephrase?

Q. So actually I would like to look if I can at the whole claim. At the very start of the claim you see the language a computer program product?

A. Yes.

Q. So did you explain to us earlier what in laymen's terms the product that is claimed by claim 32 is?

A. Yes.

Q. What is it?

A. This is the Purity software.

Q. So what in this claim has to perform the step of returning the identifier?

A. The Purity software.

Q. Does the SD table have to perform the step itself returning the identifier?

A. No, it does not.

Q. Does the resent table have to

perform the step returning the identifier?

A. No, it does not.

Q. Did you identify the code that you believe is involved in the look ups and returning the identifier?

A. Yes, I did.

Q. And Mr. Van Nest asked you also if you had identified only one line of code in a particular part of your report. Did you consider only one line of code in Pure Storage's source code before reaching your opinions about infringement?

A. No, I spent multiple days looking at source code in the process of reaching my opinions.

MR. ROSENBERG: I have no further questions. Thank you.

THE COURT: All right. Mr. Jestice, you may step down.

MR. KREVITT: Ready for us to proceed, Your Honor?

THE COURT: Yes.

MR. KREVITT: Your Honor, at this time, EMC would call its next witness,

Mr. Michael Bermingham. He's coming. And Mr. Poppe, my colleague, is going to be handling this witness.

THE COURT: Sorry. Can you say your name. I don't think the jury knows you.

MR. POPPE: Good afternoon. My name is Matthew Poppe.

THE CLERK: Please state and spell your full name for the record.

THE WITNESS: Michael Bermingham. M-I-C-H-A-E-L, B-E-R-M-I-N-G-H-A-M.

MICHAEL BERMINGHAM,

the deponent herein, having first been duly sworn on oath, was examined and testified as follows:

MR. POPPE: Your Honor, may I approach?

THE COURT: Yes, Mr. Poppe.

DIRECT EXAMINATION.

BY MR. POPPE:

Q. Good afternoon, Mr. Bermingham.

A. Good afternoon.

Q. Would you please state your name

and introduce yourself to the jury?

A. My name is Michael Bermingham.

Q. And you are an EMC employee; is that correct?

A. That's correct.

Q. Why are you here to testify today?

A. I'm one of the inventors of the '556 patent. And I'm here today to talk about my invention.

Q. You have been handed a white binder. If you could open that up and take a look at Exhibit PTX 0005.

A. Okay.

Q. Is this a patent of which you are an inventor?

A. Yes, it is.

Q. And that's the '556 patent?

A. Correct.

MR. POPPE: Your Honor, I would like to offer Exhibit PTX 0005 into evidence.

THE COURT: All right. Admitted without objection.

BY MR. POPPE:

Q. And in the upper left corner of

the cover page of the patent, do you see a section called inventors?

A. Yes, I do.

Q. And is that your name listed as the second inventor?

A. Yes.

Q. Who were the other two listed inventors?

A. They're John Walton and Chris MacLellan. We worked together.

Q. How long did you work together?

A. In general or on this patent?

Q. In general.

A. Probably over the course of five, six years.

Q. What field of technology does the '556 patent related to?

A. It relates to data storage products.

Q. Is there a particular issue associated with data storage products that the patented invention addresses?

A. It deals with basically protecting data, keeping it reliable and making sure it's

successful.

Q. Do you have any other patents?

A. Yes, I have nine other patents with EMC.

Q. So we'll come back to the subject of your '556 patent in a moment. First I'd like to ask you a little bit about your personal background. Where are you from originally?

A. Originally I'm from Ireland.

Q. And where do you live today?

A. I live in California. I've lived in the US for several decades now. I lived in Massachusetts in the east coast for a while, but I'm currently in California.

Q. Did you go to college?

A. Yes.

Q. And where was that?

A. University of Limerick in Ireland.

Q. What did you study at that time?

A. I studied electronic engineering.

Q. Did you obtain any other degrees after college?

A. Yes, I have a masters degree in electrical engineering from Northeastern

University in Boston and I have an MBA from Babson College in Wesley, Massachusetts

Q. That's a masters of business?

A. Correct, yes.

Q. Moving forward a few years from your graduate degree, when did you first join EMC?

A. I joined in 1993.

Q. That was so about 22 years ago?

A. Yeah, pretty much. I remember, because my son was born the same year, '93, so he's 22.

Q. What was your position at EMC when you were hired?

A. Excuse me. I was hired as a hardware design engineer focusing on ASIC and memory design.

Q. What is an ASIC?

A. It's an acronym for -- means applications specific integrated circuit. Basically it's a computer chip.

Q. And when you refer to memory, is that another kind of computer chip?

A. Yes.

Q. During your time at EMC in the 1990's and early 2000's, was there a particular EMC product that you were working on?

A. Yes, I worked mainly on the Symmetrix product. And that was basically it was EMC's flagship storage product. We sold to large customers, institution type customer like financial institutions, banks and so forth as their kind of primary massive data storage system.

Q. And does EMC still sell the Symmetrix products?

A. They do. It's currently branded as VMAX.

Q. Your work on the invention of the '556 patent was a few years after you joined EMC; is that correct?

A. Correct.

Q. And what was your position in the company at that time?

A. I have been promoted several times. I was senior hardware engineer and team lead for, responsible for memory subsystem design for Symmetrix products.

Q. And when you say responsible for design, can you say a little bit more about what that meant at that time for you?

A. Yeah. I mean, our main focus really was around how do we kind of improve, you know, expand, enhance the Symmetrix products. So our main focus was on next generation architectures, so, you know, I think our key responsibilities, our areas of focus were reliability, performance and cost of the system.

Q. You said reliability, performance and cost; is that right?

A. Correct.

Q. And when you say reliability, what does that mean in this context?

A. Well, in the context of data storage, what it really means is keeping customers' data safe, making sure it doesn't get lost or corrupted, making sure it's always available to the customer in a timely manner.

Q. And what does performance mean in this context when you used it to describe the work you were doing?

A. Essentially speed, how quickly you

can store or retrieve data.

Q. And how do the issues of reliability, performance and cost work together?

A. Well, essentially there, you know, reliability and performance both cost cost. They incur cost, right? So there's a balance. You can develop the most, you know, very high performing system, an extremely reliable system, but in general adding reliability for data storage means adding additional components, adding redundancy, so all of that costs, so there's a trade off there.

Q. All right. So we're talking about your general position and responsibilities in the early 2000's. Was that also around the time that you ended up going to business school?

A. Correct, yes.

Q. And how did that come about?

A. Well, with my, you know, increased responsibility, I became closer to, you know, the business aspects of, you know, of the technology and, you know, how it related to real customer needs, so that was -- became a big interest area for me. And you know, I'm always

interested in learning more, so it was a good opportunity. EMC paid for my business school, so, you know, I went -- I continued working at EMC, I went to school at night and weekend.

Q. Was there a point in time in the 2000's when you left EMC?

A. Yes, I left in 2005. I had an opportunity to go to a small company in California doing something completely different, so I took it up.

Q. And you eventually rejoined the company, EMC?

A. Yeah, I rejoined in 2011, a different department, different group, different product, basically. You know, I was recruited to come back to a company in Irvine, California, that EMC had acquired several years earlier, so it was a great opportunity and I was glad to come back.

Q. So taking the two periods of your employment together, you've been at the company about 16 years, right?

A. 12, yeah, 16, 17 almost years, yeah.

Q. And why have you stayed with the company so far?

A. Well, they've been a good company to work for. You know, I've done pretty well there. It's a great kind of atmosphere, very innovative, lots of innovative people. It's got a great work/life balance. It's been named one of the best companies to work in the US several times, so it's -- it's been good for me and my family.

Q. Let's turn now back to the '556 Patent and you mentioned that this patent relates to protecting data; is that right?

A. That's right.

Q. During the period that you and your co-inventors were working on the invention, what technology was in use at that time in the Symmetrix product to protect data in the part of the product that you were responsible for?

A. Okay. So in the part or subsystem of our product we used a technology called mirroring.

Q. How did mirroring work to protect data? And maybe we can pull up a slide of that.

A. Sure. Yeah. So in concept it's pretty simple. So at this -- what this depicts is a small example of data and in mirroring essentially we make a second copy of it, so any time we want to write into a storage system we do write into a separate location or a separate storage area, that way if anything happens to either of the copies of the data, you know, we're protected because we have a second copy we can use.

Q. Does mirroring have any disadvantages?

A. Yes. The primary disadvantage is cost and space, so as you can see here, again, we have three, you know, digits of bits of data in this small example, so we have to double the amount of storage we need, you know, with mirroring. So here it looks kind of trivial, if you can imagine a very large system with billions of these bits, it adds up, so it can cost in dollar costs of the memory devices and also in just space of kind of keeping of this.

Q. Did this issue have any relation to the work that you were doing in the tasks

that were assigned to you in the early 2000's period at EMC?

A. Yes. So as I had mentioned, you know, one of our prime responsibilities as a team was developing, you know, the next generation product and proving, you know, its performance and reliability and trying to achieve better cost. So in the case of the memory system, you know, it was pretty costly. We had very large, I mean physically, if you can imagine, these systems are kind of refrigerator sized and you have customers' data center is potentially hundreds of these boxes. And the memory system itself in, you know, one -- there's different versions of course, but in the kind of central box it could consume somewhere in some cases a quarter of the space, so what we were looking at in the next generation was, you know, a couple of things, how could we reduce the cost of this memory. And the semiconductor memory that we used had great benefits for features and performance, but as I said, it did cost. Also we were kind of up against it in terms of we would love to have more memory or at

least more usable memory, but we really didn't have any additional space in which to put it, so that kind of brought us along the path of exploring ways to get more efficient uses out of the memory that we did have.

Q. And what idea along those lines did you and your co-inventors have?

A. The basic idea was to use RAID which is a, you know, an existing technology for hard drives, use it for semiconductor memory.

Q. And let's bring up the next slide if we could.

So the jury has heard a little bit about RAID so far, but could you tell them using the slide how RAID works?

A. Sure. So the idea is that we do a mathematical operation called an exclusive R or XR as it's abbreviated to generate an additional bit. In this case we have the data world it's 1 0 0, and parity calculation essentially is it wants to have an even number of ones in the field. So in this example, we have 1 0 0, so there is one 1, it's an odd number of ones so the parity becomes one so that the overall

number of ones in this picture is even.

So for example, if the data had two ones, if it was a 1 1 0, then the parity would be zero, again to preserve the even number of ones. That's the basic principle of parity.

Q. Let's go to the next slide and maybe you can explain why all that math matters and is useful?

A. So what that means is right, how do we use that to protect our recover data. So this example what we're showing the missing bit here, we have lost or we corrupted a data, we don't know what it is, it could be a one or a zero. If you apply that parity operation or that XR operation, it wants to have an even number of ones. There is already an even number of ones here, so therefore the missing has to be a zero.

So it's kind of a trick if you will, but it essentially, you know, protects, you can recover the lost data from the parity information.

Q. Do you have to start with three pieces of data as in your example for this to

work?

A. No. No, this is -- typically you would never use three, but typically these are much larger data words verified over chunks of data versus a single piece of data.

Q. Let's go to the next slide, if you can explain why parity is better than mirroring?

A. So this is a summary of the two pictures that we talked about. So on the left is the mirroring picture and again we duplicated the data, we have a data and we have a copy so in this case it's six bits total. In the RAID with parity case, we have only added an additional one bit, so we need less storage for the same type of protection.

Q. Is this basic RAID process something that you and your co-inventors invented?

A. No, RAID has been around for a long time, applied to disk systems.

Q. What was it that you were trying to do that you believed was new?

A. So what we invented was a means of taking this approach and applying it to

semiconductor memories. Now, it's not as easy, it wasn't a trivial problem, not as easy as saying let's take RAID and put it in memories. There are some pretty tough performance problems you have to deal with in applying these RAID type calculations and this parity calculation to memory, so that's really what was novel about what we did.

Q. So at some point in time, you and your co-inventors had the idea of trying to use RAID in semiconductor memory; is that right?

A. Yes.

Q. And what happened next to try to figure out how to do that?

A. In terms of the process or how --

Q. Well, first maybe you can say how long a process was that to figure out the problem?

A. Sure. The way it kind of went, you know, as we're trying to look at better or more efficient use of the memory for the semiconductor memory system, you know, we had this idea of using RAID. So the next step was kind of to say okay, would that really be

feasible with semiconductor memories and kind of go through basically a whiteboarding session to look at how this worked, what the kind of got you maybe, you know, where there might be performance issues or problems we might have to work through.

So in total it probably took is about a year to probably refine it to a point where it really was workable. We weren't working on it exclusively for a year, we had a lot of other responsibilities and things to do, but in the timeline was about a year to get it done.

Q. And I apologize, it may be just me, but can you pull your microphone a little closer. I'm having trouble hearing.

A. Sure. Thanks. Better?

Q. That's better. Thanks.

A. Obviously I'm shorter than the last person.

Q. And why was it a difficult problem to solve how to do this in semiconductor memory, why wasn't it whatever had been done before with disks and using the same thing?

A. Yeah, that's a good question. I think the problem really comes down to -- okay, with RAID applied to disk systems, hard disks which is where RAID is commonly used, it does have an overhead. So to calculate the parity information here requires, it's more -- it takes more time than the mirroring. If you look at the mirroring what you're doing, you're doing two rights in parallel. In computing terms that's a relatively easy operation.

For calculating parity in RAID, you have to do multiple reads and writes and to do the exclusive R operation, so it consumes, it's got overhead.

Now in a disk system, that's not as problematic because disks are inherently much slower in semiconductor memory. As a matter of fact, the reason why you would use, you know, expensive semiconductor memory in a system like this is to kind of overcome the performance problems or limitations of drives.

The tough thing about it is now you're dealing with memory that has, you know, if you kind of mess with its performance

characteristics, right, by introducing overhead and so forth, you can lose the benefits of having the memory in the first place, so there is a bit of a balance there.

And keep in mind the system, these are pretty simple diagram of the concept, but these systems were very large systems that had a lot of parallel activity going on.

So to make sure you didn't kind of block any accesses to the memories, there was quite a bit of kind of analysis required and kind of what we came up with really is the solution was really to in how the memory itself was organized and how to control structures utilize the memory organization to kind of do the RAID operations in parallel. So we kind of hid some of the overhead so that it worked for memory subsystem.

Q. And so in the end, you were able to achieve the reliability of RAID without hurting the performance; is that right?

A. Correct.

Q. Let's look at page 15 of Exhibit 5, PTX 5. And if you could expand claim 6 in

column 15 including the line numbers on the right. Can you see that okay, Mr. Bermingham?

A. So part six here.

Q. If it's easier to use the document in front of you, whatever works for you.

A. Sure.

Q. So if I can direct your attention to lines 25 through 28. And first of all, you understand claim 6 is one of the claims that EMC is asserting against Pure Storage in this case?

A. Yes, I do.

Q. And just generally the portion of the claim related to -- in lines 25 to 28 where it talks about a parity segment and a logical exclusive-or, is this relating to the RAID that you discussed earlier?

A. Yes, exactly, that's the RAID calculation that I mentioned.

Q. And then the application of RAID to a semiconductor memory, if you look up at line 17, and is there a reference to that concept in line 17 where it says plurality of semiconductor memory segments?

A. Yes.

Q. And then finally, can you direct the jury to the portion of the claim that relates to achieving the performance that you talked about while at the same time implementing RAID in a semiconductor memory?

A. So it's essentially the last paragraph here showing each of the segments included in a respective memory region may be assigned a respective base memory different from the other segments, that's kind of a key piece.

Q. And what was it about having memory boards with respective memory regions and memory segments and the other elements of this last paragraph including the base memory address that related to this goal of achieving performance while implementing RAID in semiconductor memory?

A. Right. So there was essentially a system comprised of various memory boards which were physically, you know, separate pieces of hardware, and each board there were regions and within each region there were segments. One of the key pieces of the meaning of the base memory address is used to essentially control the

mapping or the accesses across these different areas. So we could facilitate the parallel accesses. That's one piece of it.

The second major piece is in dealing with when there is a failure situation where you have to actually rebuild, kind of the second example I had given where you got to do the computation to figure out the missing data. Once you do that, you want to take that rebuild data and store it somewhere else so the next time you need it, you don't have to suffer the same performance penalty. So that's, you know, essentially got to do with our using, you know, the concept of memory segments and base addresses.

Q. Just taking a base memory address independently by itself, was that something that you invented?

A. No.

Q. It was the combination that was your invention?

A. Yeah. It was using that in the context of this kind of distributed memory system, and you know, parallel control access

that would allow us to do it.

Q. And in the experience that you had encountering base memory addresses before this invention, can you just describe that experience and what, you know, what a base memory address is in that context of your prior experience?

A. Essentially it refers to a kind of an access method where you can, you know, specify where a chunk of memory can be found and located.

Q. And why is that useful?

A. It allows, among other things, kind of virtual memory systems or physical to logical translation. So what I am by that is kind of maybe like in a computer system the processing element is dealing with its own set of addresses, so it wants memory, it has a means, it kind of knows where memory is, but in the physical system when things start going wrong, you can kind of remap that without having to burden the process or to know where things are.

Q. And at the time that you and your co-inventors developed the invention, what did

you believe the implications of the invention were?

A. Well, we thought it had pretty wide implications and we were trying to solve a particular problem for a product at the time, but it was clear to us that it was -- it had pretty wide implications that this could essentially be applied to any similar semiconductor memory system that was looking for, you know, more efficient reliability.

MR. POPPE: Thank you very much.

THE COURT: All right. Members of the jury, despite the heat, you all seem to still be alert, but let's not push it. So let's take a break for 15 minutes and then we'll come back and wrap up for the day. Take the jury, out please.

All right. You can all be seated. Is there anything you need to discuss?

MR. KREVITT: Not from us, Your Honor.

MR. VAN NEST: I'm not sure if we're going to get to Doctor Jones or not today.

THE COURT: I would think we'd get

started with him.

MR. VAN NEST: If we are, Mr. Johanningmeier has some comments about slides that we were shown.

MR. JOHANNINGMEIER: Your Honor, we received some demonstratives last night that they intend to use and they have some testimony pulled from some witnesses who haven't been here and who aren't designated. Now we understand that experts can rely on hearsay, but we are objecting to the fact that they are going to be displaying testimony on the screen that comes from -- and these aren't 30(b)(6)'s, these are witnesses who just simply aren't here, so they are -- they are using their expert to bring in testimony and so we're objecting to that as improper.

In addition there's one of the slides where they've cut it down and excluded the question and put it in ellipses and all that. We have an objection to that. It's just improper use of the expert to get testimony into the record.

MR. POPPE: Your Honor, all of the

witnesses in question are Pure Storage engineers who developed functionality and Doctor Jones is simply going to be explaining how he, in support of his opinions, he relied on meaningful information about how these products work. He's certainly not going to read the full extent of what these Pure Storage engineers testified, but it's reasonable for him to show the basis of his opinions. And in the one case where there are ellipses, it's simply because the engineer in question, English was his second language, understandably he had some stuttering and repeating of words and we simply cleaned it up. There's been no indication to us in the amount of time that this has been raised that there's anything misleading resulting from those ellipses and it wouldn't be helpful for the jury to see a bunch of uhs and stuttering.

THE COURT: Do I take it, Mr. Johanningmeier, that your objection is not so much that he relies on these statements to support his opinions so much, but that he -- that they want to put the statements up on the screen?

MR. JOHANNINGMEIER: That's exactly it. It's the manner of presentation. Basically we had a process for designating depos and encountering and figuring out a way to get the system and deal with objections and this is sort of circumventing that and putting snippets on the screen. The cut down one isn't just to deal with English problems. He's taken a question off the slide.

THE COURT: So pretty hard for me to deal with that in the abstract.

MR. JOHANNINGMEIER: I understand. I could hand it up if you'd like.

THE COURT: Well, I think -- how many slides are we talking about, Mr. Johanningmeier?

MR. JOHANNINGMEIER: I think it's five or six. I mean, we told them we didn't object to the people who were 30(b)(6)'s, but the other ones, it's six slides. Some of these witnesses will be here to testify later in the case as well.

MR. POPPE: But he needs to explain the basis for his opinion now.

THE COURT: All right. Well, he can explain the basis without necessarily having deposition excerpts up on the slides, right? That's what we seem to be all agreeing.

MR. POPPE: He can and he certainly will, but I think it's reasonable for him to.

THE COURT: Well, let me just think about that. I'll come back in a few minutes, but I'm kind of inclined to think that, for basically hearsay that I have a certain amount of discretion as to what to do with it. And having random statements from what I take to be engineers being deposed in their personal capacity, you know, seems to me to unnecessarily call that out. Let me think about that for a minute and I'll be back in a few minutes.

MR. JOHANNINGMEIER: Thank you, Your Honor.

THE COURT: All right. Just before we bring the jury in, Mr. Johanningmeier, you have these six slides or whatever that you object to?

MR. JOHANNINGMEIER: Yeah. Yes,

Your Honor, I do. May I approach.

THE COURT: Yes, please. Are they the ones?

MR. JOHANNINGMEIER: I'll tell you what numbers they are. It's numbers 16, 32, 20, 31, 33 and 34.

THE COURT: All right. I will look at them as we head in -- as we proceed.

MR. POPPE: And I'll be sure not to pull up a slide until you've approved it.

THE COURT: Thank you, Mr. Poppe. All right. Let's get the jury.

All right. Thank you, jury. Welcome back. Everyone may be seated. Mr. Johanningmeier.

MR. JOHANNINGMEIER: I have a binder to pass up to the witness. And Your Honor, may I approach?

THE COURT: Sure. Yeah.

BY MR. JOHANNINGMEIER:

Q. Okay. Good afternoon, Mr. Bermingham.

A. Good afternoon.

Q. Now, in your examination earlier

you mentioned you know an EMC employee named Mr. Christopher McClellan, right?

A. I do know Chris, yes.

Q. And he's one of your co-inventors on the '556 Patent, right?

A. Correct.

Q. And you know he was deposed in this litigation concerning the '556 Patent, right?

A. Yes.

Q. In fact, you met him shortly before he was deposed, right?

A. I was on a conference call with him.

Q. Now, have you reviewed his deposition testimony since then?

A. No.

Q. Okay. Now, when you met with Mr. -- when you had your call with Mr. McClellan, you understood that he had been picked by EMC to be the company's spokesperson about the '556 Patent, right?

A. When I last met with him, I believe that was prior to his being deposed.

Q. But you knew that he was going to be deposed, right?

A. At that time I did not.

Q. Okay. And you haven't been deposed in this case before, right?

A. Correct.

Q. Now, I think you said this already but I want to talk about it a little bit because you put up some slides about RAID and talked about some of the advantages of RAID. You did not invent RAID; correct?

A. Correct.

Q. RAID was invented by computer scientists at Berkley in the '80s; right?

A. I believe that's correct.

Q. When did you first learn about RAID technology?

A. Probably in the '80s I learned about it.

Q. And have you ever looked at scholarly papers about RAID?

A. I have read some articles and so forth, yes.

Q. Could I show the witness DTX 528.

This is an image here, a picture of a patent. Have you ever seen this particular article before?

A. Not that I recall.

Q. So you wouldn't -- so we can take that down.

Now, let's look at your patent which is the '556 patent, DTX 5. And I want to call up on the screen the background of the invention and that's at column one and lines 24 to 29.

So now you see this paragraph that's been highlighted here. The section of the background of the patent talks about the things that came before the invention; right?

A. Yes.

Q. So this patent says here that EMC's own Symmetrix products applied RAID before you filed for the '556 patent; right, it talks about it in the background of the patent?

A. Yes. For the disks, correct.

Q. So Symmetrix had RAID technology on the disk before the '556 patent that was filed on August 9th of 2001; right?

A. Correct.
Q. And so, in fact, you didn't invent the RAID with parity that was used on the disk that you talked about in your exam; correct?
A. Yes.
Q. You didn't invent mirroring?
A. Correct.
Q. Have you heard mirroring referred to as RAID 1, RAID Level 1?
A. Yes.
Q. And RAID with parity that you were talking about, would you call that RAID Level 4 or 5, have you heard that before?
A. Yes, generally it's RAID 5.
Q. Let's go back to the cover of the patent. Now this section of the patent I want to call out under other publications, this is the section of the patent that talks about prior art publications; right?
A. Yes.
Q. So these are documents that came before the patent; right?
A. Yes. Sorry. Correct.
Q. So there is one listed here from

author Holland and it's called Fast On-Line Failure Recovery in Redundant Disk Arrays and it was presented at the Fault-Tolerant Computing Conference in 1993. Do you see that?

A. I do.

Q. Can we call up DTX 523 for the witness. Now, does this appear to be a copy of the Holland paper, the Fast on-Line Failure Recovery in Redundant Disk Arrays from 1993?

A. Yes.

MR. JOHANNINGMEIER: I would ask to move this into evidence.

MR. POPPE: Relevance, Your Honor.

THE COURT: Why are you moving that.

MR. JOHANNINGMEIER: It's the prior art of the patent. Maybe I could ask a couple of questions to make that clear.

THE COURT: I'm just wondering what's the disputed point that you're addressing here?

MR. JOHANNINGMEIER: Your Honor, the witness displayed some stuff about mirroring and about parity on the board and so I wanted to

just clarify the things that are in the prior art are not things that he invented.

THE COURT: He said that a number of times already.

BY MR. JOHANNINGMEIER:

Q. I'll just ask you. The stuff you put up about mirroring and about parity and the benefits of one versus the other, this was all stuff that was well-known in the prior art; right?

A. That's correct.

Q. Now, you mentioned that you came back into the EMC fold when your company was acquired. What company were you working for at the time?

A. No, I came back into EMC to join the different division that had been acquired. It was a company that was acquired by EMC, so I was working for Western Digital prior to rejoining EMC.

Q. What was that company that had been acquired?

A. Called Avamar.

Q. Now, Avamar had made some

deduplication products in the past; correct?

A. Correct.

MR. POPPE: Objection. Beyond the scope, Your Honor.

THE COURT: I'm going to overrule. Wait. We're not talking about deduplication here. So I'll sustain it.

MR. JOHANNINGMEIER: I'm sorry, Your Honor, I'll move on.

BY MR. JOHANNINGMEIER:

Q. In your examination, you mentioned the subsystem of the product that you had been working on, I think you called it a memory system, you said it was in the central box; is that right?

A. Yes.

Q. And you mentioned system semiconductor memory that was used there?

A. Correct.

Q. So that was SD ram or D ram memory that you were talking about that was used in that subsystem; right?

A. That was what we used, yes.

Q. It was not Flash?

A. Correct.

Q. And just to be clear, Flash is not mentioned at all in the '556 patent; right?

A. I don't believe so.

Q. And there is nothing about the patent that was directed to particularly for Flash memory as opposed to some other kind of memory; right?

A. No, it was semiconductor memory, which is Flash is a type of semiconductor memory as is D ram.

Q. There was no optimization, just Flash, because Flash wasn't even mentioned; right?

A. Right.

Q. Now, you talked a little bit about base memory addresses. And, of course, you didn't invent that concept; right?

A. Correct.

Q. And those are commonly used in computer systems and they have been for a very long time; right?

A. Yes.

Q. You said that one of the things

that they are used for is to control mapping to facilitate parallel accesses; right?

A. Right.

Q. That wasn't just in your system that they used for that, that's in lots of systems of base memory addresses are used for that; right?

A. Possibly.

Q. I think you mentioned that base memory addresses are used in virtual memory systems; is that right?

A. Yes.

Q. Do you know of any other applications for base memory addresses?

A. I mean, I'm familiar with some that I have dealt with which essentially is remapping of memory between different physical locations in general.

Q. So it's a very broad concept; right? Is that fair?

MR. POPPE: Objection. Vague.

THE COURT: I'm going to overrule it. Can you rephrase the question?

Q. I said base memory address is a

concept that has very broad applicability; right?

A. Sorry, yes.

Q. So it could be applied to lots of different things; right?

A. It depends again on the context of the application.

Q. And it had been applied to lots of different things in the prior art in the past before your patent; right?

MR. POPPE: Objection, Your Honor. The witness is not testifying as an expert and questioning about prior art is irrelevant.

THE COURT: I'm going to sustain the objection.

BY MR. JOHANNINGMEIER:

Q. Now, did you do any searching for prior art before you applied for the '556 patent?

A. Yeah, we did some searching.

Q. Where did you look?

A. There were some online sources so essentially it was an online search.

Q. Did you disclose all of the art

you found to the PTO?

A. Yes. Well, we disclosed it to our attorneys.

Q. Now, in that search you were looking for art that was applying RAID to solid state memory, right?

MR. POPPE: Objection, Your Honor 402.

THE COURT: I'm sorry, louder.

MR. POPPE: 402. Sorry, Your Honor. No issue in the case.

MR. JOHANNINGMEIER: He testified that that invention was applying RAID to solid state memory.

THE COURT: But you're asking something different here so I'm going to sustian the objection.

MR. JOHANNINGMEIER: Thank you, Your Honor.

BY MR. JOHANNINGMEIER:

Q. Now, in your direct examination you put up some slides showing the XOR calculations, right, simple XOR parody calculation?

A. Yes.
Q. Of course you did not invent that, right?
A. That's correct.
Q. That was well known?
A. Yes.
Q. Before you came up with patent?
A. Yes.
Q. Base memory addresses were well known before you came up with the patent, right?
A. Yes, in certain applications.
Q. And of course we know RAID was well known in general?
A. Correct.
Q. Now, dividing up memory into regions and segments, that was well known in the art, right?
A. Not so sure about that. I hadn't come across too many. I'm sure there was. I mean any large memory system to some extent you have to subdivide it, so --
MR. JOHANNINGMEIER: I don't have any further questions. Thank you.
THE COURT: All right. Thank you,

Mr. Johanningmeier. Any redirect?

MR. POPPE: Just one question, Your Honor.

BY MR. POPPE:

Q. Mr. Bermingham, the Symmetix systems that counsel drew your attention to in the patent that pre-existed your invention and use RAID, that use of RAID was in the disks not in semiconductor memory; is that correct?

A. Yes, that's correct.

MR. JOHANNINGMEIER: Your Honor, may I clarify one thing?

THE COURT: I'm going to give you a chance, but it better be good.

BY MR. JOHANNINGMEIER:

Q. When you mentioned the Symmetrix system had used RAID in the central memory system, right, it used RAID 1 mirroring?

A. We used RAID 1 also known as mirroring, correct.

MR. JOHANNINGMEIER: Thank you.

THE COURT: All right. Mr. Bermingham, thank you very much. You may step down.

THE WITNESS: Thank you.

MR. POPPE: Your Honor, our next witness is Doctor Mark Jones.

THE COURT: All right. Can I see you and whose ever from somebody from the other side over at side bar for just a minute?

(Side bar discussion.)

THE COURT: All right. So what I take it is your dealing with those quotes from these depositions here are things that would otherwise be inadmissible but they are going to be admitted or they are going to be referred to by the expert because it's under Rule 703 because it's going to help the jury evaluate, the probative value is to help the jury evaluate the opinions substantially outweighs any prejudicial effect, but I do think putting them up on the slide elevates them to a more -- you know, you get more from the testimony having them not appear than if they would appear. And that doesn't -- and that seems to me to be unnecessary. So what I'd like for you is to remove, not use those slide, but you can still ask them, you know, what it is people said that

supports his opinion, all right?

MR. JOHANNINGMEIER: Just to be clear, the witness reading the testimony verbatim into the record would have the same effect, but it would have the witness credibility to it.

THE COURT: He's either going to be summarizing it -- some of that is pretty bulky stuff. I don't know whether it's going to be subject to summary or not, but I think he could probably, I'm sure he's a smart guy, he could probably summarize it, but if he needs to read it, he can read it. But that's not the preferable way to do it. Better to synthesize it.

MR. POPPE: Okay. Thank you, Your Honor.

MR. POPPE: Your Honor, may I move the easel?

THE COURT: Sure.

MARK THOMAS JONES,

the deponent herein, having first been duly sworn on oath, was examined and testified as

follows:

THE COURT: So, Mr. Poppe, so I have just minor point. Neither the witness nor I can see the easel.

MR. POPPE: That's a fair point, Your Honor. If I move it back into the corner facing out, is that acceptable?

THE COURT: I'm not going to give you technological instructions here, but you know, the jury needs to be able to see it and us.

MR. POPPE: Understood.

BY MR. POPPE:

Q. Good afternoon, Doctor Jones, would you please state your name and introduce yourself to the jury?

A. Yes. My name is Mark Jones and I'm a professor of electrical and computer engineering at Virginia Tech.

Q. Yeah, and if you could just make sure your microphone is in a good spot so everyone can hear. Thank you. What is your occupation?

A. I'm a professor in computer

engineering.

Q. And where are you professor?

A. At Virginia tech. That's in Blacksburg, Virginia.

Q. Please tell the jury why you're here today?

A. I'm here to explain my analysis and conclusions as they relate to infringement of the '556 patent that we've been hearing about.

Q. Are you being paid for your work?

A. Yes, I'm being paid at $450 an hour.

Q. Does your compensation depend in any way on the testimony that you give or the outcome of the case?

A. No, it does not.

Q. Please tell the jury about your educational background?

A. I received my Bachelor of Science in computer science and minor in computer engineering in 1986 from Clemson University and then I went on to get a PhD from Duke University in computer science in 1990.

Q. What did you do after getting your degree?

A. I joined the mathematics and computer science division at Argon National Laboratory which is part of the Department of Energy and I was there for three years.

Q. What did you do after that?

A. I joined the computer science faculty at the University of Tennessee at Knoxville and then in 1997 I got a chance to go back home to Blacksburg and I joined the faculty at Virginia Tech where I've been ever since.

Q. During your work as a university professor, what experience have you had with the data storage technologies?

A. I've been obviously we've covered that when I was an undergraduate and graduate student. I've also taught it in multiple classes to undergraduates and graduates, graduate students. I've also been involved in research that uses data storage including new architectures, computer architectures that make use of things like Flash memory as an integral part of the architecture.

Q. And during your work as a university professor, what experience have you had with RAID technologies?

A. I've experienced both teaching RAID to students and using it in our laboratory.

MR. POPPE: Your Honor, at this time I would proffer Doctor Jones as an expert in the fields of data storage and RAID.

MR. JOHANNINGMEIER: No objection.

THE COURT: All right. You may proceed.

BY MR. POPPE:

Q. And Doctor Jones, can you give us an outline of the testimony that you're prepared to give today?

A. I've had some slides prepared that summarize the testimony or at least the points I'm going to hit and we'll be referring to this throughout and we'll just take these one at a time as they come up. The first one is just briefly give you an overview of RAID technology.

Q. And you were in the courtroom during the testimony of Mr. Bermingham; is that right?

A. Yes, I was.

Q. And so I don't want you to bore the jury with things that they've already heard. So I'm going to skip ahead through a bit of this, but can you just illustrate for the jury a bit about what the name RAID actually means?

A. Well, it stands for as you see here redundant array of independent or inexpensive disks. The word array refers to the fact that there are multiple disks across, they are kind of arrayed together, so it's a collection of disks. The word redundant refers to the ability to -- having at least one extra disk that will have enough information to recover data, as Mr. Birmingham explained.

Q. And so if we go to the next slide, can you explain how this illustrates the issue of redundancy?

A. Yes, this is -- represents the parody information in this case stored on a single disk and this is the type of parody information that Mr. Bermingham was explaining in his slides.

Q. And you'll recall he told the jury

about how an exclusive-or operation works, correct?

A. Yes.

Q. And did his description match your understanding?

A. Yes, it did.

Q. And did his description match your understanding of how parody is used to provide reliability in a data storage system?

A. Yes, it did.

Q. What is the next topic that you'll be covering?

A. This is a brief discussion of the '556 Patent before we get into the actual analysis of the claims for infringement purposes.

Q. And do you have a binder in front of you?

A. Yes, I did.

Q. And if you could turn to Exhibit PTX- many zeros and 5.

A. I'm there.

Q. This is the '556 Patent. It's already in evidence. And if you could please

explain for the jury what your view of the key aspects of this invention are?

A. This is one of the two claims at issue, Claim 6, and we'll just take it in three parts. Part 1 as we heard Mr. Bermingham explain, this is a patent that applies to semiconductor memory. Semiconductor memory, as an example, that would be DRAM. Another example of that would be Flash memory.

Another part, part two highlighted in yellow, that's the parity calculation that Mr. Bermingham was explaining and that covers or is computed with logical exclusive-or.

The third element below is a novel architecture for an organization for the memory itself that allows efficient use of semiconductor memory when it's combined with RAID. And we'll cover this in more detail later, but I have highlighted in green some of the key ideas there that it's memory segments that are inside of our subdivisions of memory regions which were also on memory boards. And then we also highlighted the base memory address aspect which gives the flexibility to realize

some of the advantages of semiconductor memory when combined with RAID.

Q. So you started to touch on this. Would you please explain to the jury your view of the benefits that accrue from using this invention in a data storage product?

A. Yes. Taken together the invention provides reliability from the RAID capabilities, it provides performance from the semiconductor memory being used efficiently, as well as the ability, the flexibility of the base memory address allows for space efficiency and we'll see that a bit more later.

Q. Have you looked at the issue of whether EMC has used this invention in any of its own products?

A. I analyzed the XtremIO product and found it makes use of the invention.

Q. What's your analysis to arrive at that conclusion?

A. I examined how the XtremIO array functions based on documents both internal and external hard XtremIO as well as the source code that describes how XtremIO operates.

Q. What is the next topic that you're going to cover?

A. This is a, just a high level overview of the Pure Storage FlashArray product. We have already seen a fair amount about it, but I'm going to focus on one element of it.

Q. You stated that it's your opinion that claims 6 and 7 of the '556 patent are infringed by the FlashArray; is that correct?

A. Yes, this is the product at issue and this is a product I compared to the claims and ultimately reached the conclusion that it infringes. And I'll be explaining that conclusion later.

Q. This is now the Pure Storage product that you're talking about?

A. Yes.

Q. Is there a particular product feature that you focused on in your infringement analysis regarding FlashArray?

A. Yes. The overall name of the feature or generally referred to as the RAID-3D feature by Pure Storage.

Q. Have you seen evidence that Pure

Storage regards RAID-3D as an important feature of the FlashArray?

A. Yes, I have seen many Pure Storage documents that show that and I can show you one of those up here soon.

Q. Can you just --

MR. POPPE: Your Honor, I would like to display PTX 141. And if we could bring up the cover page, please. And if you could expand the bottom section where it says reliability.

BY MR. POPPE:

Q. Dr. Jones, do you recognize this as a portion of Pure Storage's website?

A. Yes, I do.

Q. And do you see that in the middle of this, what's been blown up which was at the bottom of the first page of the exhibit, it says reliability?

A. I do.

Q. And can you explain what Pure Storage is referring to in this part of its website?

A. So Pure Storage is describing

their RAID-3D scheme and they're indicating that it provides the benefit of reliability. They're also indicating that it's specifically designed for solid state, they mean solid state memory, the type of memory they use is Flash memory. They also indicate that it's able to realize minimal space overhead so space efficiency, and that it can reduce average latency which would be a performance benefit.

Q. And you mentioned solid state. Is that another word for semiconductor memory?

A. Well, semiconductor is an example of solid state. Solid state generally means no moving parts in computer chips such as Flash memory has no moving parts.

Q. There is a reference here to parity. Do you see that, the fourth line down?

A. Yes, I do.

Q. And is that a reference to the type of parity that we heard in the context of RAID?

A. Yes. It makes reference to the use of parity, for example, as we'll see later in more detail.

MR. POPPE: Your Honor, I offer PTX 141 into evidence.

MR. JOHANNINGMEIER: No objection.

THE COURT: Admitted without objection.

BY MR. POPPE:

Q. And what is the next topic you'll be testifying about?

A. The actual analysis we'll go through that shows at a high level the analysis that I did to determine whether or not the FlashArray infringes claim 6 and 7 of the '556 patent. And I'll explain how I reached my conclusions.

Q. Was that generally the same process as what you described with respect to EMC's XtremIO product?

A. Yes, comparing how the product works to the claims of the patent.

Q. So we have in the corner a poster board with a bunch of text we have now established nobody can see, but it does, in fact, show each of the elements of claim 6 and 6 of the '556 patent. Is that something that you

confirmed yourself?

A. Yes, I had that board prepared and checked it.

Q. And you mentioned that you were here during Mr. Bermingham's testimony. Have you been here throughout the trial proceedings?

A. Yes, I have.

Q. And so did you hear at the start of the trial the arguments, or I'm sorry, the positions stated by Pure Storage about why they claim the FlashArray does not infringe these claims?

A. I did.

Q. And you heard the focus of that argument was on the base memory address element of the claims?

A. Yes.

Q. Do you agree with their arguments about that particular element?

A. No, I don't. I can explain that in a little more detail, but in essence I analyzed it and have shown that a base memory address is, in fact, assigned and I can present evidence for that.

But essentially as I understand Pure Storage's argument, they're arguing that this has to be a physical address that this base memory address must be that, and also that it must be somehow assigned in the SSD itself, and I disagree with both of those positions.

Q. So I'll ask you to address that in more detail, but let's go through the rest of the claim, and since that particular element is at the bottom, we'll get to that in more detail toward the end.

Actually, can you please bring up on the screen exactly what I was going to ask you for. And blow up the very top line of that.

Dr. Jones, do you see where it says at the start of claim 6 that the invention being claimed is a memory system?

A. Yes, I do.

Q. And have you looked at whether FlashArray is a memory system?

A. Yes, I have. I have analyzed that and found that it is a memory system and, in fact, it's the particular memory system that's claimed here, the claim elements, but it is a

system that stores and retrieves data and it's built using as we have seen Flash memory. So I found that element to be present.

Q. If we could please pull up PTX 12. My understanding is that's in evidence. If we could look at that in your binder. Do you recognize this as the FlashArray users guide?

A. Yes.

Q. And if we can jump ahead to page 26. And then if you could expand the section that begins, Flash Memory: Like disk, but different.

Dr. Jones, can you explain to the jury what you found in this exhibit that's relevant to your opinion regarding FlashArray being a memory system?

A. Yes. This is explaining that the FlashArray, the Pure Storage FlashArray is built to take maximum benefit from Flash storage. It's built on Flash memory as opposed to, for example, the spinning hard drives that we heard about in the trial as well.

Q. And did you see this Flash memory used anywhere else in the users guide of PTX 12?

A. I have seen it in the users guide and throughout Pure Storage documents. That's what people call it, it's Flash memory.

Q. And my plan had been to have us check off one by one the elements on the board over there, but since it's a bit inconveniently located, maybe we'll address that later on in your examination. But you do agree that the top line there is met by the FlashArray system?

A. Yes, I do.

Q. Now, the claim, claim 6 uses several other terms that include the word memory; is that right?

A. Yes, they do, the memory regions, memory segments and memory boards.

Q. And if I can have the slide show back, please. I'm going to jump ahead a few slides. And if you could please explain to the jury the relationship between those elements that you identified, the memory boards, memory regions and memory segments?

A. Yes. This slide illustrates it fairly well. We have got a memory board, an example of that in the upper right-hand corner

of the screen you see is that green board and it has some of those black rectangles on it are Flash memory chips. That's according to the claim are divided into memory regions, and I have illustrated that here with four memory regions in those big rectangles in the middle.

And then finally the memory segment is represented by the letter S where each memory region is divided into memory segments.

Q. In the upper left of this slide there is some language from claim 6 and then a definition of the term memory region. That's the Court's claim construction of that term; is that right?

A. Yes, the construction is a subset of memory on a memory board that can be accessed, and that's the meaning that is to be used for memory region in the claim.

Q. Is that the meaning that you have used in your analysis?

A. Yes, I used the Court's claim constructions throughout my analysis.

Q. In this diagram you mentioned that

the memory regions and segments as depicted here are in the shape of a rectangle. Is there any significance to that shape?

A. No, there is not a particular shape or some particular layout, this is just a convenient example.

Q. Do you want to take us right to slide 13. And Dr. Jones, do you recognize where this picture is from?

A. Yes. It's from a Pure Storage video that is demonstrating aspects of their product.

MR. POPPE: And I'll note it's from PTX 102 and I'll move that into evidence.

MR. JOHANNINGMEIER: No objection.

THE COURT: Admitted without objection.

BY MR. POPPE:

Q. And how does this relate to your analysis and specifically with regard to the element memory board?

A. This is an example of the memory board that I've identified within the Pure Storage system, so this is a memory board in one

of the SSD's that are in the Pure Storage product.

Q. Do the FlashArray memory boards have memory regions?

A. Yes, they do. The Pure Storage organizes the memory into what's known as write units which are the memory regions of the claims.

Q. Can you explain your answer in relationship to this slide, please?

A. Yes. In this slide I'm basing this off of general documents from Pure Storage, but I'm representing here that each column that you see in this diagram is a solid state drive. And that's a memory that has a memory board. And it's the memory board of the claims. And then that memory board is further divided into write units. And I have highlighted write units on each one of the solid state drives, but there are many write units on each one of the memory boards on the solid state drives.

Q. And what evidence have you seen that those pages -- I'm sorry. Preliminary question. So you mentioned that the Court has

defined memory region to be a subset of memory on a memory board that can be accessed. What evidence have you seen indicating that the FlashArray memory regions are subsets of memory? And you may refer to slide 16 if you would like.

A. Yes. Evidence that I have seen includes, of course, my analysis of the source code in the system, but also I have seen deposition testimony from Pure Storage's witnesses as well as Pure Storage documents.

Q. And can you summarize for the jury any particular deposition testimony from Pure Storage witnesses that you relied on in that regard?

A. My recollection is testimony that explains that Pure Storage has allocation, what they call allocation units which is a division of the memory on the boards and that those allocation units are further subdivided into write units and those correspond to the memory on the SSD.

Q. Do the FlashArray memory regions contain memory segments?

A. Yes, they do. They're further

divided into pages, and each -- so each write unit is divided into multiple pages, and I have depicted here in this diagram with the red grids there that shows the write units are divided into pages, and I have blown up one example of the page, but every one of the write units is divided into multiple pages.

Q. And what evidence have you seen indicating that those pages are portions of memory?

A. Again, my analysis of the source code, but also deposition testimony that explains this subdivision and confirms my understanding.

Q. So now looking back, if we can go back to the claim language, please, in PTX 5, and looking at the next element below where it says memory system, the claim requires a plurality of semiconductor memory segments, the segments being grouped into groups. Why do you believe the FlashArray meets this claim element?

A. The semiconductor memory segments are the pages. And those pages are grouped into groups through a parity computation that takes a

page from each one of the --

Q. Let me just stop you. Let's bring up a slide again, slide 21, please. Sorry, go ahead with your answer.

A. So, Pure Storage organizes their parity computation such that they across what they call a write stripe, one of their terminologies, takes a page from each one of the write units and groups that together by competing parity over it and they store that parity in another one of the write units, a page of the write units.

Q. Just to wrap that up, how does that result in groups of memory segments?

A. Well, these are groups together logically in the software, but also the computation of the parities over that group of pages, so the parity that's grouping them together.

Q. Your slide highlights one group of pages in that particular write stripe. Would there be other groups of pages in that same write stripe, in that same write stripe?

A. Yes, there would be many groups in

each of the write stripes. This is just one of many of the groups and they would all have the same number of pages or memory segments.

Q. And then you mentioned these are your slides; correct?

A. Yes.

Q. But you have mentioned that you based them off of Pure Storage documents?

A. Yes, I have examined as well as the Pure Storage software, but it is a representation of what I have seen in the documents as well as their source code.

Q. And if you could take a look at this, which is page 11 from the FlashArray users guide, PTX 12 as well as page seven of another Pure Storage document, PTX 119, are these examples that you based your own diagram off of?

A. Yes, I think the one on the left is from page 31 of the users guide.

Q. I misstated that.

MR. POPPE: Your Honor, I offer PTX Exhibit 119 into evidence.

MR. JOHANNINGMEIER: No objection.

THE COURT: Admitted without

objection.

BY MR. POPPE:

Q. And then if we can once again pull up the language of claim 6. The next part of that element mentioned that each of the groups includes N respective semiconductor memory segments, the number N being an integer. What did you conclude about whether FlashArray meets that element?

A. I concluded that element is met actually for the reasons I just explained that --

Q. Let's pull up that slide again so you can explain.

A. As I indicated there were multiple groups there and each one of those groups would have the same number of pages, the number of pages in that group up there, it would be five, but that number is consistent throughout that, throughout the groups in the write stripe.

Q. And so in this instance where it says there are in respective semiconductor segments in a group, what would N be in this example?

A. In my example N would be five, typically much larger on the Pure Storage system.

Q. Going back to again to the language of claim 6, it next states that the N respective segments in each speculative group comprises, I'm going to skip the respective's, data segments and a parity segment. What have you concluded whether that element is met?

A. I concluded that is met for the reasons I just explained. You saw that there were data segments and then a parity segment also in the group.

Q. And just so we're clear, let's go back to the slides, please. Which of the five pages indicat?

A. The one labeled P, that's the one where parody could be computed over the four pages on the left, and then the page in the right hand labeled P would be the parody.

Q. And can you summarize for the jury briefly what evidence you saw that Pure Storage does use the exclusive-or calculation to generate the parody?

A. Yes.

Q. MP?.

A. Yes, I saw that in testimony from Pure Storage witnesses, but I also confirmed it in the source code itself.

Q. And why in this slide have you not included a page from the Q right unit on the, the far right?

A. The group that's formed by computing parody P is that particular group in Q is not grouped with P in that computation, but there's also a group that could include Q as well, but for simplicity I've shown it just with P.

Q. So am I correct that if we look at the language of the Claim 6, you've now covered the entirety of that larger claim element below memory system?

A. Yes. And I believe we've covered the next one as well, because that one addressed the calculation using exclusive-or.

Q. Maybe now since we've gotten through part of it, can I ask you to check off the portions of the corresponding claim on the

board behind you?

The next element says that the segments reside in memory regions of a memory board. How does FlashArray satisfy that element?

A. That's satisfied by the explanation I gave earlier, where there's a memory board that's one of the -- that's the board in an SSD that's divided into the regions for the right units and then the right units are further divided into the pages that I just described which are the segments.

Q. All right. And so the next claim element below where you put the check marks is met as well, leaving us with one to discuss?

A. Yes.

Q. And based on what you've heard so far in the trial, are you aware of anything being disputed by Pure Storage in what we've talked about so far, any of those check marked boxes or the additional one that you've just discussed?

A. No, not based on what I've heard so far at trial.

Q. And so if we now move to the last claim element of Claim 6, again you explained before your understanding that the disputed point here relates to base memory address?

A. That's correct.

Q. And do you have a view on whether the Pure Storage FlashArray includes base memory addresses?

A. Yes, I do. My analysis shows that it does include a base memory address that is assigned to the segments in the way specified in the claims.

Q. And let's please show Slide 26. So this is the definition that you've used?

A. Yes, down below an address used as a reference point to which a relevant address may be added to determine the address of the storage location to be accessed.

Q. And so in reference to that definition, can you explain to the jury what an address is?

A. It's at a high level an address is essentially a number that a computer uses to refer to something in memory, so it's trying to

find a location in memory and it uses that as a, as the indication of what it wants to either write to or read from.

Q. And what in the Pure Storage FlashArray system in your view is a base memory address? And let me show our next slide.

A. The base memory address in the Pure Storage system that meets this limitation is the page number that's assigned to a page by the Pure Storage software.

Q. And you mentioned that the -- I'm sorry, one moment. So, what in the Pure Storage system is the relevant address that the Court's definition of base memory address requires?

A. You can -- in the Pure Storage software, you can add to the, to this reference point or base memory address the page number, and offset that would be used to locate a block within that page that we've been talking about.

Q. So, and with respect to this particular slide, can you show here where is the base memory address and what is the -- how does the offset work to identify a storage location?

A. So this is just an example I

prepared to explain kind of a little bit of the concept of base memory address. And for this, a base memory address is referring to the, in this case the upper left part of the memory segment or the really the beginning of the memory segment and the offset in this case, 13, is just how far to move into that memory segment, in this case, to find the data that you're looking for, and in this case just that white square there.

Q. And so in the Pure Storage system, you mentioned a page number as the base memory address; is that right?

A. Yes, a page number that would be the base memory address of a particular page.

Q. And then what is the offset -- first of all, why is an offset needed in the Pure Storage system?

A. In the Pure Storage system they are trying to, as we saw earlier, in multiple ways trying to reduce the amount of data that's actually -- space that's taken up actually on the Flash memory, so they pack in information, and these C Blocks are examples of information

that's packed into each page and then ultimately you want to retrieve that information and you want to find that particular C Block, so you need to move into the middle of the page like C Block 2 there, you would need to have an offset to locate C Block 2.

Q. So C Block, that's a term that Pure Storage uses internally to describe these blocks of data?

A. Yes.

Q. And so if we wanted to use the Pure Storage system to get at that second C Block, can you explain how that would involve the use of a base memory address?

A. Yes, Pure Storage, when I want to find one of these C Blocks, not only stores the page number where it's located, but in addition they also store and basically the offset within that page where that C Block starts.

Q. All right. Now, you summarized earlier the reasons why you understand Pure Storage disagrees that they have a base memory address. And again, here we show the claim language and we show the claim construction.

What is your understanding of -- you also explained specifically that they disagree with whether the page number that you were referring to is an address. And can you explain why you believe it is?

A. It's what's being used to locate the information that's being retrieved and to refer to it, so it's being used like an address and my examination of the source code of Pure Storage indicates that they believe it's an address as well, at least within the design of the source code.

Q. And in your reading of the claim and in particular of the Court's claim construction, do you understand there to be any limitations on the type of address that it can be?

A. There's no limitation that it would have to be for example a physical address. That language doesn't appear in the claim or the claim construction. It has to meet the claim limitation and the Court's construction, but as I explained, it meets that.

Q. And what is your view as to

whether a person of ordinary skill in the art reading a reference to an address would understand that to exclude physical address?

A. Well, we've already heard about different types of addresses in the testimony thus far, but from the point of view of one of ordinary skill in the art, a computer address isn't restricted to either a physical or a logical address, they are both types of addresses.

Q. The claim -- this portion of the claim also mentions that a base memory address may be assigned. Do you see that in the fourt row of this part of the claim?

A. Yes, I do.

Q. What is it in FlashArray that identifies the page number that you've identified in the base memory address?

A. It's the software, the Purity software that's running that assigns the page number to the pages.

Q. And is there anything in the claim, based on your analysis, that restricts that act of assigning to any particular portion

of the product?

A. No, no there's not.

Q. Have you seen any evidence indicating -- any evidence from Pure Storage indicating that the page number indicates a particular physical location on the memory?

A. Yes, I've seen testimony from Pure Storage witnesses that explains how the process works and how it's used to locate the information as it's stored on the SSD's.

Q. All right. And if we can bring the full Claim 6 up again. Just to wrap up on your discussion of Claim 6, the second part of that element mentions that the base memory address that's assigned to a memory segment is different from other respective base memory addresses assigned to other segments in the same memory region and is that claim element met by FlashArray?

A. Yes, it is. They assign the base memory addresses to the pages in a way that varies across the pages that it is, it's not just unique, it's -- there's no way to view them as the same base memory address for each one of

the pages that are -- page numbers that are assigned.

Q. And then so in summary, having gone through each of the elements, do you have an opinion as to whether Claim 6 is infringed by the Pure Storage FlashArray?

A. Yes, it's my opinion that Pure Storage's FlashArray product infringes Claim 6 of the '556 Patent because it meets each and every element as my analysis shows.

Q. Claim 7 adds just one additional element; is that correct?

A. Yes, Claim 7 is a dependent claim and so it includes all of the limitations of Claim 6 that's indicated by the language that says the memory system of Claim 6, plus it has an additional element that has to be met.

Q. And the additional element essentially is that each of the memory segments in a group must be on a different memory board; is that right?

A. Yeah, the memory segments are distributed among electrical circuit boards and then there's language such that none of the

circuit boards includes more than one respective segment from each respective group. So every memory or every electrical circuit board or memory board has to have exactly or at most one segment.

Q. And are you aware -- and FlashArray does that?

A. My analysis shows that that's the way the FlashArray system works and that is part of the design to make the parody effective so that if you lost one of the boards you would still be able to recover the information on it using the exclusive-or.

Q. Are you aware of any dispute over whether that part of Claim 7 is met by the FlashArray?

A. No, I didn't hear anything dispute go that.

Q. During your testimony you referred to a couple of instances where certain claim language had been interpreted by the Court and you followed that interpretation in your analysis. Did you do that with all of the claim interpretations that were provided by the Court

for these claims of the '556 Patent?

A. Yes, I did.

THE COURT: Mr. Poppe, would this be a good time to end for the day?

MR. POPPE: Sure. That would be fine.

THE COURT: Okay. All right. Members of the jury, we are going to end for the day, so basically three things; one, we'll start again tomorrow at 9:30, so you were good, you were all here, try to be here so we can start at 9:30. I'll meet with the lawyers and try to make sure we're all ready so we don't waste a lot of time.

Second thing is I want to repeat my instruction about not discussing this case with each other or with anybody else, family, your friends. Don't post things electronically about it. Keep your thoughts to yourself and keep your mind open so that when you do discuss the case a week from now, you know, you don't unfairly concentrate on one piece of -- you know, you don't make up your mind until you actually discuss it with or colleagues here.

The third thing is, don't do any research, don't go on Google or anything to try to find out things that you'd like to know a little bit more about than you've heard so far. Everything that you're going to learn about this case, you need to learn about it in the courtroom, so don't do any independent research of any kind.

All right. Can we take the jury out and have a nice evening.

So Mr. Poppe, I'm sorry, I tried -- I'm trying to, you know, break at a time where it seemed appropriate. I knew you weren't going to be able to finish what you had to do in the next 30 seconds, so if I didn't quite catch the moment right, I'm sorry about that. All right, is there anything else anybody wants to discuss?

MR. KREVITT: Nothing from the Plaintiff, Your Honor. Thank you.

MR. VAN NEST: Your Honor, I'd just like to get a sense of when Plaintiff's case, and I use the word rest in quotes because I understand I'm keeping it open for them to

examine.

THE COURT: Actually that's a very reasonable question. So first off, after we finish with Mr. -- Doctor Jones -- no, no, I remember the last name. I try to get the titles right here.

MR. KREVITT: Doctor Jones.

THE COURT: Doctor Jones, professor, what more do you have on -- you have your damages person for sure.

MR. KREVITT: Here's what we have, Your Honor. We have the videotape and then we have two more witnesses, Josh Goldstein whom you met the first day, and our damages expert, Brian Napper. And then we're done in the way Mr. Van Nest means. We're not going to rest.

THE COURT: Right. And you said tape, is that still thirty minutes of tape?

MR. KREVITT: I don't have an exact number. I think we're in that range. We're certainly sub one hour and I think we're in the thirty to forty-five minutes range.

THE COURT: So it sounds to me like you probably are not going to finish before

lunchtime tomorrow?

MR. KREVITT: No, I wouldn't think so, Your Honor, based on -- I don't know how long, any sense how long the cross-examination will be of Dr. Jones?

MR. JOHANNINGMEIER: Probably not too lengthy. Probably short.

MR. KREVITT: Assuming it's not too lengthy, around lunchtime or shortly into the mid afternoon.

MR. VAN NEST: That gives me a good sense, Your Honor. Thank you.

THE COURT: Okay. All right. So there is nothing else, we'll be in recess and we'll see you tomorrow morning at nine o'clock.

(Court recessed at 5:03 p.m.)

State of Delaware)
)
New Castle County)

CERTIFICATE OF REPORTER

I, Dale C. Hawkins, Registered Merit Reporter, Certified Shorthand Reporter, and Notary Public, do hereby certify that the foregoing record, Pages 348 to 692 inclusive, is a true and accurate transcript of my stenographic notes taken on March 8, 2016, in the above-captioned matter.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 8th day of March 2016, at Wilmington.

/s/ Dale C. Hawkins

Dale C. Hawkins, RMR